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FORTRAN IV ENHANCED CHARACTER GRAPHICS



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COMPUTER SCIENCE & TECHNOLOGY:

FORTRAN IV Enhanced Character Graphics

Special publication No. 500-32

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FORTRAN IV ENHANCED CHARACTER GRAPHICS

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ABSTRACT. A FORTRAN IV subroutine is described which allows the drawing of six styles of alphabetic characters, three styles of numbers, and 48 special mathematical symbols from the enhanced graphic character set of Dr. A. V. Hershey. Twenty two symbols for graph plotting are also provided. Output is by linkage to an external subroutine PLOT. The program requires a computer which can accommodate a 30 bit word-length.

Key words: Alphabets; COM; computer graphics; computerized typesetting; digital plotting; plotting; type fonts; type setting; vectorized characters

I. INTRODUCTION. The enhanced graphic characters of Dr. A. V. Hershey (1), (2) are suitable for use on pen plotters or computer output microform devices using vector graphics. The subroutines presented here are an extension of those previously developed (3) to make the Hershey characters available with subroutines conforming as closely as possible to the American Standards Association FORTRAN IV Standard (4) so as to be useable on a variety of computers. The characters provided include the SIMPLEX ROMAN, SIMPLEX GREEK, DUPLEX ROMAN, COMPLEX ROMAN, COMPLEX GREEK, and COMPLEX ITALIC alphabets; SIMPLEX, COMPLEX, and DUPLEX numerals (as described in Refs (1) and (2)); and 48 special characters and mathematical symbols.

II. COMPUTER ORGANIZATION. The data to describe the characters and symbols are included in a BLOCK DATA subprogram of about a thousand cards. The data are in the form of decimal integers less than 2^{30} to accommodate a variety of computer word-lengths. The current 30 bit implementation allows the encoding of two (x,y) pen instructions per computer word. Each 15 bit pen instruction contains 3 bits of pen up or pen down information, 6 bits of x-coordinate information, and 6 bits of y-coordinate information. A zero instruction indicates the end of the character. In order to allow for textual input from various computers the input characters are limited to the 47 FORTRAN characters, that is A-Z, blank, 0-9, and + - / = () * , . \$. Eleven additional non-FORTRAN characters are used for control information; these characters may be varied by local option at each computer site.

Partial word accesses are provided for by means of an internal FORTRAN FUNCTION:

IFLD(N1,N2,WORD)

which retrieves bits N1 through N2 of WORD as an integer when the bits are numbered from the right (starting with 1).

Character (byte) access is provided by another internal function CHAR(J) which returns the J'th character of a textual string in the form of a binary integer. This function (which uses IFLD) will work on those computers which allow alphabetic characters to be manipulated as integers. This is the case with the IBM 360/370 and UNIVAC 1100 computers. For others the functions CHAR or IFLD may need to be rewritten.

The BLOCK DATA subprogram is written in an extension of FORTRAN IV which allows definition of arrays in DATA statements. This extension is compatible with most FORTRAN compilers.

All of the routines were run through the Pfort verifier (5), and no errors other than those of the FORTRAN extension were detected. To date the program has run successfully on the IBM 370, UNIVAC 1100, CDC 7600, and PDP-11 computers.

III. DESCRIPTION OF THE PROGRAMS

SYMBOLTEST - MAIN PROGRAM

This is a main program which draws all of the alphabets and plots all of the plotting symbols available.

LENGTH(XLEN,HEIGHT,TEXT,N)

This subroutine returns in XLEN the length in inches of a textual string TEXT comprising N characters. This information is useful for centering and alignment.

STRIN(I,TEXT)

This integer function returns the I'th computer word of the textual string 'TEXT'. It is used only internally in SYMBOL.

SYMBOL(X,Y,HEIGHT,TEXT,THETA,N)

This subroutine draws graphic characters and plot symbols.

When N is positive, N characters from the textual string TEXT are drawn. When N is negative, and TEXT is a binary integer between 0 and 21, a centered symbol from the set of 22 plotting symbols is plotted at (X,Y). When N is nought, a single simplex alphameric character (right justified in TEXT) is plotted at (X,Y). When X and/or Y = 999., the annotation is continued following the X and/or Y termination in the previous call to SYMBOL. The conventions for N<0 and N = 0 were designed to be compatible with local vendor supplied software. Minor modifications to the programs will accommodate other conventions.

BLOCK DATA

The BLOCK DATA subprogram contains the data to draw the Hershey characters and the plotting symbols. Variables which need to be saved and the initialization of the computer character set are also included in this subprogram.

IV. OPERATION OF THE SUBROUTINE SYMBOL. The subroutine is accessed by a FORTRAN subroutine call:

```
CALL SYMBOL(X,Y,HEIGHT,TEXT,THETA,N)
```

For the case in which $N > 0$ or $N = 0$:

X,Y = coordinates of lower left hand corner of text
HEIGHT = character height (capital letters) in inches
TEXT = ALPHAMERIC textual array or Hollerith argument
The data must be right justified in TEXT if a single character is desired and $N = 0$.
THETA = Angle (degrees) of inclination of TEXT to the horizontal
N = Number of characters in textual array.
If $N = 0$ a single character right justified in TEXT is plotted.

For the case in which $N < 0$:

X,Y = Coordinates of a centered symbol
HEIGHT = Size of symbol in inches
TEXT = Integer between 0 and 21 designating the desired symbol
THETA = Angle (degrees) of inclination of TEXT to the horizontal
N = Code indicating whether or not to draw a line through points:
 $N = -1$ A single centered symbol is plotted at (X,Y);
 $N < -1$ A line is drawn from current point to (X,Y), and a centered symbol is plotted.

The input string TEXT may contain the 47 FORTRAN characters for text and 11 non-FORTRAN characters which are used for control information. The control characters may be varied at implementation time by changing the associated data card in the BLOCK DATA subprogram. The current significance of the control characters is as follows:

1	\	Next character subscript
2	"	Next character superscript
3	@	Initiate upper case (default)
4	#	Initiate lower case
5	&	Initiate complex letters/numerals
6	^	Next character greek or math symbol
7	%	Initiate simplex letters (default)
8	?	Backspace (up to six backspaces allowed for)
9	!	Initiate italic letters/numerals
10	;	Initiate duplex letters/numerals
11	:	Terminate scan

Mathematical and special symbols are accessed by the control code ![^]. Since there are no italic greek characters this region of the table has been used to provide the 48 special characters and mathematical symbols. If no control information is provided in the input string, the default options of simplex upper case letters is supplied so that the program is 'downward compatible'. Up to six backspaces are allowed for in the program so that aligned subscripts and superscripts can be generated.

V. GRAPHICAL OUTPUT. The output of the test program is shown in Figs. 1 and 2. These figures show the range of characters and plotting symbols available. The program listings are in Appendix I. In Appendix II a special Fortran V version suitable for the UNIVAC 1100 is given.

For information on how to produce a desired character, reference should be made to the character repertory of Fig. 1. Each of the characters in the lines starting with numerics are produced by the corresponding FORTRAN character preceded by the appropriate control character(s) as shown to the right of the line. Characters in the lines beginning with alphabetic characters or mathematical and special symbols are produced by the control characters to the right of the line followed by the corresponding sequential alphabetic character. Thus for example the graphic sequence $\Sigma \Theta$ is produced by the string argument to SYMBOL of '![^]S[^]T[^]', since S and T are the 19th and 20th letters of the alphabet and Σ and Θ are the 19th and 20th graphics in the line governed by control code ![^]. Reference to the test program in Appendix I, which produced Figs. 1 and 2, will show in detail the calling sequence for the graphic and plotting symbols shown in the figures.

VI. STEPS FOR IMPLEMENTATION.

(1) Install the appropriate version of the function IFLD at line SYM00800 of SYMBOL and at line TST00090 of the test program. Univac 1100 machines have one's complement arithmetic, while the IBM 360/370, and DEC PDP-10 and PDP-11 have two's complement arithmetic.

(2) Install the selected special characters at line DAT0830 of BLOCK DATA.

(3) Change the DATA statement at line DAT00840 of BLOCK DATA appropriate to the computer in use. (IOUT is the Fortran unit for line printer output.) NWORD and NCHAR are in general the number of bits per word and number of bits per character respectively.

(4) Provide a subroutine PLOT to generate plotter output for your plotting device.

The following versions of the program have been tested and are included to assist user implementation.

UNIVAC 1100 FIELDATA FORTRAN

NWORD=36

NCHAR=6

IBM 360/370

NWORD=32

NCHAR=8

CDC 7600

NWORD=60

NCHAR=6

IFLD(NSTART,NBITS,IWORD)=AND(SHIFT(MASK(NBITS),NBITS),
2SHIFT(IWORD,NWORD-NSTART+NBITS))

REFERENCES

- (1) A. V. Hershey, 'A Computer System for Scientific Typography', Computer Graphics and Image Processing, Vol.1., pp 373-385 (1972)
- (2) N. M. Wolcott and J. Hilsenrath, NBS Special Publication 424, "Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols". U. S. Govt. Printing Office, (1976)
- (3) N. M. Wolcott and F. L. McCrackin, Computer Graphics, Vol. 11, No.2, pp 121-127, (1977)
- (4) American Standards Association, 'American Standard Fortran', X3.9-1966, March, (1966)
- (5) B. G. Ryder and A. D. Hall, 'The PFORT Verifier', Bell Laboratories Computing Science Technical Report No. 12, July, (1975)

DISCLAIMER

Certain commercial products and instruments are identified in this paper in order to specify adequately the experimental procedure. In no case does such identification imply recommendation or endorsement by the National Bureau of Standards, nor does it imply that the products or equipment identified are necessarily the best available for the purpose.

SIMPLE CHARACTERS		Control Codes
ABCDEFGHIJKLMNOPQRSTUVWXYZ	αβγδεζηθικλμνξοπρστυφχψω	none or @
ABΓΔΕΖΗΘΙΚΑΜΝΞΟΠΡΣΤΥΦΧΨΩ	0123456789+-/=()*\$,.	none or @
abcdefghijklmnopqrstuvwxyz		^
αβγδεζηθικλμνξοπρστυφχψω		#
0123456789+-/=()*\$,.		#^
		none or @

BOLD CHARACTERS		&
ABCDEFGHIJKLMNOPQRSTUVWXYZ	αβγδεζηθικλμνξοπρστυφχψω	&
ABΓΔΕΖΗΘΙΚΑΜΝΞΟΠΡΣΤΥΦΧΨΩ	0123456789+-/=()*\$,.	&^
abcdefghijklmnopqrstuvwxyz		&#
αβγδεζηθικλμνξοπρστυφχψω		&#^
0123456789+-/=()*\$,.		&
ABCDEFGHIJKLMNOPQRSTUVWXYZ		!
abcdefghijklmnopqrstuvwxyz		!#
<>∂∇ε≤≥∞∫∫∞±∓×÷∏·√Σθ}}@ø		!^
[]#§†;:;!%&;:;!~<> X°→φ‡		!#^
0123456789+-/=()*\$,.		!
ABCDEFGHIJKLMNOPQRSTUVWXYZ		;
abcdefghijklmnopqrstuvwxyz		;;#
0123456789+-/=()*\$,.		;

VERTICAL

INDEXICALS

A_{34}^{12} B_{56}^{1234}

πr^2

a_{12}

Fig. 1 CHARACTER REPERTORY

APPENDIX I. PROGRAM LISTINGS

```

C      MAIN PROGRAM TO TEST THE SYMBOL ROUTINE                                TST00010
C      ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789+/-/=(,),.$                      TST00020
      DIMENSION BUFFER(1000)                                                  TST00030
      DIMENSION JJ(1)                                                         TST00040
      DIMENSION OLDX(6),OLDY(6),IA(256),IB(58)                               TST00050
      COMMON /SAVE/ XL,OLDX,OLDY,IA,IB,NWORD,NCHAR,NCWD,IOUT,FIRST,LNGTH TST00060
      LOGICAL FIRST,LNGTH                                                    TST00070
C      IFLD GETS N BITS STARTING AT NSTART TH BIT FROM RIGHT                TST00080
      IFLD(NSTART,NBITS,IWORD)=MOD(IWORD/(2** (NSTART-NBITS)),2**NBITS)+( TST00090
2(1-ISIGN(1,IWORD))/2)*(2**NBITS-1)                                         TST00100
C      ***USE ABOVE CARD IF YOUR MACHINE HAS ONES COMPLEMENT ARITHMETIC    TST00110
C      2 (1-ISIGN(1,IWORD))/2)*(2**NBITS-MIN0(1,                             TST00120
C      3MOD(-IWORD,2** (NSTART-NBITS))))                                    TST00130
C      ***USE ABOVE CARD IF YOUR MACHINE HAS TWOS COMPLEMENT ARITHMETIC    TST00140
      CALL PLOTS (BUFFER,1000,9)                                             TST00150
      CALL LENGTH (XST,.2,18HSIMPLE CHARACTERS:,50)                         TST00160
      XST=2.5-XST/2.                                                         TST00170
      CALL SYMBOL (XST,10.5,0.2,18HSIMPLE CHARACTERS:,0.,23)                TST00180
      CALL SYMBOL (0.,10.0,0.2,26HABCEFGHIJKLMNOPQRSTUVWXYZ,0.,26)         TST00190
      CALL SYMBOL (0.,9.7,.2,48H^A^B^C^D^E^F^G^H^I^J^K^L^M^N^O^P^Q^R^S^T TST00200
2^U^V^W^X,0.,48)                                                           TST00210
      CALL SYMBOL (0.,9.4,0.2,27H#ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,27)        TST00220
      CALL SYMBOL (0.,9.1,.2,49H#^A^B^C^D^E^F^G^H^I^J^K^L^M^N^O^P^Q^R^S^T TST00230
2^U^V^W^X,0.,49)                                                           TST00240
      CALL SYMBOL (0.,8.8,0.2,20H0123456789+/-/=(,),.$,0.,20)             TST00250
      CALL LENGTH (XST,.2,17H&BOLD CHARACTERS:,25)                         TST00260
      XST=2.5-XST/2.                                                         TST00270
      CALL SYMBOL (XST,8.0,0.2,17H&BOLD CHARACTERS:,0.,22)                 TST00280
      CALL SYMBOL (0.,7.5,0.2,27H&ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,27)        TST00290
      CALL SYMBOL (0.,7.2,.2,49H&^A^B^C^D^E^F^G^H^I^J^K^L^M^N^O^P^Q^R^S^T TST00300
2^U^V^W^X,0.,49)                                                           TST00310
      CALL SYMBOL (0.,6.9,0.2,28H&#ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,28)       TST00320
      CALL SYMBOL (0.,6.6,.2,50H&#^A^B^C^D^E^F^G^H^I^J^K^L^M^N^O^P^Q^R^S^T TST00330
2^T^U^V^W^X,0.,50)                                                         TST00340
      CALL SYMBOL (0.,6.3,0.2,21H&0123456789+/-/=(,),.$,0.,21)            TST00350
      CALL SYMBOL (0.,6.0,0.2,28H!@ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,28)       TST00360
      CALL SYMBOL (0.,5.7,0.2,28H!#ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,28)       TST00370
      CALL SYMBOL (0.,5.4,.2,49H!^A^B^C^D^E^F^G^H^I^J^K^L^M^N^O^P^Q^R^S^T TST00380
2^U^V^W^X,0.,49)                                                           TST00390
      CALL SYMBOL (0.,5.1,.2,50H!#^A^B^C^D^E^F^G^H^I^J^K^L^M^N^O^P^Q^R^S^T TST00400
2^T^U^V^W^X,0.,50)                                                         TST00410
      CALL SYMBOL (0.,4.8,.2,21H!0123456789+/-/=(,),.$,0.,21)             TST00420
      CALL SYMBOL (0.,4.5,0.2,28H!@ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,28)       TST00430
      CALL SYMBOL (0.,4.2,0.2,28H!#ABCDEFGHIJKLMN0PQRSTUVWXYZ,0.,28)       TST00440
      CALL SYMBOL (0.,3.9,.2,21H!0123456789+/-/=(,),.$,0.,21)            TST00450
      CALL SYMBOL (1.,1.,.21,8HVERTICAL,90.,8)                             TST00460
      CALL SYMBOL (2.,2.,.21,28HINDEXICALS #^PR"2 &#A\1\2,0.,28)         TST00470
      CALL SYMBOL (2.,1.6,.21,28H@A"1"2??\3\4 B"1"2"3"4??\5\6,0.,28)     TST00480
      CALL PLOT (10.,0.,-3)                                                  TST00490
      XMARG=1.                                                                TST00500
      YMARG=9.                                                                TST00510
      STEP=.1                                                                TST00520
      XINC=1.                                                                TST00530
      DO 50 J=1,4                                                            TST00540
      DO 40 I=1,6                                                            TST00550
      JJ(1)=I+(J-1)*6-1                                                    TST00560
      XX=XMARG-4.*STEP                                                       TST00570
      YY=YMARG-4.*STEP                                                       TST00580
      XXX=XX                                                                TST00590
      YYY=YY                                                                TST00600

```


	DO 10 II=1,9	TST00610
	CALL PLOT (XXX,YYY,3)	TST00620
	CALL PLOT (XXX+.8,YYY,2)	TST00630
10	YYY=YYY+STEP	TST00640
	XXX=XX	TST00650
	YYY=YY	TST00660
	DO 20 II=1,9	TST00670
	CALL PLOT (XXX,YYY,3)	TST00680
	CALL PLOT (XXX,YYY+.8,2)	TST00690
20	XXX=XXX+STEP	TST00700
	DO 30 K=1,2	TST00710
	IF (JJ(1).LE.22) CALL SYMBOL (XMARG,YMARG,.8,JJ,0.,-1)	TST00720
	IF (JJ.GT.14) CALL SYMBOL (XX,YY,.8,JJ,0.,-1)	TST00730
30	XMARG=XMARG+XINC	TST00740
40	CONTINUE	TST00750
	YMARG=YMARG-2.	TST00760
	XMARG=1.	TST00770
50	CONTINUE	TST00780
	DO 60 I=1,22	TST00790
	JJ(1)=I-1	TST00800
	CALL SYMBOL (XMARG,YMARG,.15,JJ,0.,0)	TST00810
	JJ(1)=IFLD(NWORD,NCHAR,IB(I+20))	TST00820
	CALL SYMBOL (XMARG,YMARG+.5,.15,JJ,0.,0)	TST00830
60	XMARG=XMARG+.5	TST00840
	XMARG=1.	TST00850
	YMARG=.5	TST00860
	CALL PLOT (XMARG,YMARG,3)	TST00870
	DO 70 I=1,22	TST00880
	JJ(1)=I-1	TST00890
70	CALL SYMBOL (XMARG,YMARG,.15,JJ,0.,-2)	TST00900
	XMARG=XMARG+.5	TST00910
	CALL PLOT (0.,0.,999)	TST00920
	STOP	TST00930
	END	TST00940

C	SUBROUTINE SYMBOL (X,Y,HEIGHT,TEXT,THETA,N)	SYM00010
C		SYM00020
C	*****	SYM00030
C		SYM00040
C	FORTRAN IV(MOSTLY) VERSION 3.0 AUGUST 1977	SYM00050
C	PROBLEMS ETCETERA CONTACT N.WOLCOTT,NBS,301-921-3384	SYM00060
C		SYM00070
C	*****	SYM00080
C		SYM00090
C	SIMILAR TO ROUTINE SYMBOL USED IN PEN PLOTTERS	SYM00100
C	INSTRUCTIONS FOR DRAWING CHARACTERS ARE IN ALFBET STORED	SYM00110
C	TWO INSTRUCTIONS PER WORD. A ZERO FOR PEN POSITION INDICATES	SYM00120
C	END OF A CHARACTER. INPUT TEXTUAL STRINGS MUST BE COMPOSED OF ONLY	SYM00130
C	THE FORTRAN CHARACTERS A-Z 0-9+/-/()*\$,.\$ AND THE NON-FORTRAN	SYM00140
C	SPECIAL CHARACTERS WHICH ARE DESCRIBED BELOW.	SYM00150
C	X,Y = (X,Y) COORDINATE OF LOWER LEFT HAND CORNER OF TEXT	SYM00160
C	HEIGHT = HEIGHT (IN INCHES) OF UPPER CASE CHARACTERS	SYM00170
C	TEXT = INPUT TEXTUAL ARRAY OR HOLLERITH STRING	SYM00180
C	THETA = ANGLE IN DEGREES OF TEXT FROM X-AXIS	SYM00190
C	N = NUMBER OF CHARACTERS IN TEXT STRING	SYM00200
C		SYM00210
C	IF N IS NEGATIVE AND TEXT IS A BINARY INTEGER BETWEEN	SYM00220
C	1 AND 21 A CENTERED SYMBOL FROM THE SYMBOL SET IS PRODUCED	SYM00230
C	AT (X,Y).	SYM00240
C	IF N IS 0 A SINGLE SIMPLEX ALPHANUMERIC FORTRAN CHARACTER	SYM00250
C	(RIGHT JUSTIFIED IN TEXT) IS PRODUCED AT (X,Y).	SYM00260
C	IF X AND/OR Y EQUAL 999. THE ANNOTATION WILL BE CONTINUED	SYM00270
C	AFTER THE PREVIOUS X AND/OR Y TERMINATION.	SYM00280
C		SYM00290
C	ISTART(I) CONTAINS THE INDEX INTO ALFBET OF THE FIRST INSTRUCTION	SYM00300
C	OF CHARACTER NUMBER I WHOSE WIDTH IS STORED IN WIDTH(I)	SYM00310
C	CHARACTERS 1 TO 26 ARE ROMAN SIMPLEX UPPER CASE	SYM00320
C	CHARACTERS 27 TO 50 ARE GREEK SIMPLEX UPPER CASE	SYM00330
C	CHARACTERS 51 TO 76 ARE ROMAN SIMPLEX LOWER CASE	SYM00340
C	CHARACTERS 77 TO 100 ARE GREEK SIMPLEX LOWER CASE	SYM00350
C	CHARACTERS 101 TO 126 ARE ROMAN COMPLEX UPPER CASE	SYM00360
C	CHARACTERS 127 TO 150 ARE GREEK COMPLEX UPPER CASE	SYM00370
C	CHARACTERS 151 TO 176 ARE ROMAN COMPLEX LOWER CASE	SYM00380
C	CHARACTERS 177 TO 200 ARE GREEK COMPLEX LOWER CASE	SYM00390
C	CHARACTERS 201 TO 226 ARE ITALIC UPPER CASE	SYM00400
C	CHARACTERS 227 TO 250 ARE MATHEMATICAL AND SPECIAL SYMBOLS	SYM00410
C	CHARACTERS 251 TO 276 ARE ITALIC LOWER CASE	SYM00420
C	CHARACTERS 277 TO 300 ARE MATHEMATICAL AND SPECIAL SYMBOLS	SYM00430
C	CHARACTERS 301 TO 320 ARE SIMPLEX DIGITS AND SPECIAL SYMBOLS	SYM00440
C	CHARACTERS 321 TO 340 ARE COMPLEX DIGITS AND SPECIAL SYMBOLS	SYM00450
C	CHARACTERS 341 TO 360 ARE ITALIC DIGITS AND SPECIAL SYMBOLS	SYM00460
C	CHARACTERS 361 TO 380 ARE DUPLEX DIGITS AND SPECIAL SYMBOLS	SYM00470
C	CHARACTERS 381 TO 432 ARE DUPLEX UPPER AND LOWER CASE	SYM00480
C	ISPEC(11) ARE ELEVEN SPECIAL CHARACTERS CHOSEN FROM THE NON-	SYM00490
C	FORTRAN SET AT YOUR SITE. CURRENT IMPLEMENTATIONS FOLLOW	SYM00500
C	SP11 MAY BE SET TO THE COMPUTER STOP CODE IF ONE EXISTS.	SYM00510
C	SP1 \ NEXT CHARACTER SUBSCRIPT	SYM00520
C	SP2 " NEXT CHARACTER SUPERSCRIPIT	SYM00530
C	SP3 @ TURN ON UPPER CASE	SYM00540
C	SP4 # TURN ON LOWER CASE	SYM00550
C	SP5 & TURN ON COMPLEX LETTERS	SYM00560
C	SP6 ^ NEXT CHARACTER GREEK LETTER OR MATH SYMBOL	SYM00570
C	SP7 % TURN ON SIMPLEX LETTERS	SYM00580
C	SP8 ? BACK SPACE LAST CHARACTER	SYM00590
C	SP9 ! ITALIC LETTERS	SYM00600
C	SP10 ; DUPLEX LETTERS	SYM00610
C	SP11 : TERMINATE SCAN	SYM00620
C		SYM00630

```

C *****SYM00640
C DIMENSION TEXT(1),IFORT(47),IA(256),IB(58),ISPEC(11)SYM00650
DIMENSION ALFBET(4711),WIDTH(432),ISTART(432),ISYMO(128)SYM00660
DIMENSION JSTSYM(22)SYM00670
DIMENSION OLDX(6),OLDY(6)SYM00680
COMMON /IALPH/ WIDTH,ALFBET,ISTART,ISYMO,JSTSYMSYM00690
COMMON /SAVE/ XL,OLDX,OLDY,IA,IB,NWORD,NCHAR,NCWD,IOUT,FIRST,LNGTHSYM00700
LOGICAL FIRST,LNGTHSYM00710
INTEGER STRIN,CHAR,TEXT,ALFBET,ISTARTSYM00720
EQUIVALENCE (IB(1),IFORT(1)), (IB(48),ISPEC(1))SYM00730
C RX=CX-SYSYM00740
C RY=SX+CYSYM00750
C RX(X,Y)=RY(-Y,X)SYM00760
C RY(X,Y)=RX(Y,-X)SYM00770
C IFLD GETS N BITS STARTING AT NSTART TH BIT FROM RIGHTSYM00780
IFLD(NSTART,NBITS,IWORD)=MOD(IWORD/(2**((NSTART-NBITS))),2**NBITS)+(SYM00790
2(1-ISIGN(1,+IWORD))/2)*(2**NBITS-1)SYM00800
C ***USE ABOVE CARD IF YOUR MACHINE HAS ONES COMPLEMENT ARITHMETICSYM00810
C 2 (1-ISIGN(1,IWORD))/2)*(2**NBITS-MINO(1,SYM00820
C 3MOD(-IWORD,2**((NSTART-NBITS))))SYM00830
C ***USE ABOVE CARD IF YOUR MACHINE HAS TWOS COMPLEMENT ARITHMETICSYM00840
C CHAR(J) GETS THE J TH CHARACTER OF NCHAR BITS FROM A STRINGSYM00850
C COMPOSED OF WORDS NWORD BITS LONG.SYM00860
CHAR(J)=IFLD((NWORD-MOD((J-1),NCWD)*NCHAR),NCHAR,STRIN((J+NCWD-1)/SYM00870
2NCWD,TEXT))SYM00880
R(X,Y)=CO*XX-SI*YYSYM00890
IF (.NOT.FIRST) GO TO 20SYM00900
NCWD=NWORD/NCHARSYM00910
DO 10 I=1,58SYM00920
LL=IFLD(NWORD,NCHAR,IB(I))SYM00930
IA(LL+1)=ISYM00940
10 CONTINUESYM00950
20 FIRST=.FALSE.SYM00960
THE=THETA*355./(180.*113.)SYM00970
SI=SIN(THE)SYM00980
CO=COS(THE)SYM00990
SCALE=HEIGHT/21.SYM01000
C OFFSET OF 11 UNITSSYM01010
X1=XSYM01020
Y1=YSYM01030
IF (X1.GT.998.5) X1=OLDX(6)SYM01040
IF (Y1.GT.998.5) Y1=OLDY(6)SYM01050
NN=NSYM01060
IF (NN) 50,30,120SYM01070
30 ICHR=NCWD-1SYM01080
IG=CHAR(ICHR+1)SYM01090
IC=IA(IG+1)SYM01100
IF (IC.LE.47) GO TO 40SYM01110
GO TO 440SYM01120
40 NN=1SYM01130
GO TO 140SYM01140
0 IF (N.EQ.-1) GO TO 60SYM01150
CALL PLOT (X1,Y1,2)SYM01160
60 IG=TEXT(1)+1SYM01170
IF (IG.LE.22) GO TO 70SYM01180
GO TO 440SYM01190
70 I6=JSTSYM(IG)SYM01200
I5=30SYM01210
80 I8=IFLD(I5,3,ISYMO(I6))SYM01220
C GO TO CENTER OF SYMBOLSYM01230
IF (I8) 100,90,100SYM01240
90 CALL PLOT (X1,Y1,3)SYM01250
SYM01260

```

	X1=X1+20.	SYM01270
	Y1=Y1+20.	SYM01280
	GO TO 440	SYM01290
100	IX=IFLD(I5-3,6,ISYMB0(I6))	SYM01300
	IY=IFLD(I5-9,6,ISYMB0(I6))	SYM01310
	XI=SCALE*(FLOAT(IX-32))	SYM01320
	YI=SCALE*(FLOAT(IY-32))	SYM01330
	CALL PLOT (X1+R(XI,YI),Y1+R(YI,-XI),I8)	SYM01340
	I5=45-I5	SYM01350
	IF (I5.EQ.30) I6=I6+1	SYM01360
	GO TO 80	SYM01370
120	DO 130 I=1,6	SYM01380
	OLDX(I)=X	SYM01390
130	OLDY(I)=Y	SYM01400
	ICHR=0	SYM01410
C	CHARACTER	SYM01420
140	IC=0	SYM01430
C	SIMPLEX CAPITAL LETTERS	SYM01440
	IP=0	SYM01450
	ICAP=0	SYM01460
	ICOMP=0	SYM01470
	ITALIC=0	SYM01480
	IDUPLE=0	SYM01490
C	NOT GREEK LETTERS	SYM01500
	IGREEK=0	SYM01510
C	PRINT SYMBOL ON LINE (NOT SUBSCRIPT OR SUPERSCRIPIT)	SYM01520
	L=1	SYM01530
	SCALE=HEIGHT/21.	SYM01540
	DO 430 I1=1,NN	SYM01550
C	EXTRACT CHARACTER FROM TEXT	SYM01560
	ICHR=ICHR+1	SYM01570
	IG=CHAR(ICHR)	SYM01580
	IC=IA(IG+1)	SYM01590
	IF (ICHR.GT.NN.AND.N.GT.0) GO TO 450	SYM01600
	IF (IC.LE.58) GO TO 160	SYM01610
	WRITE (IOUT,150) IG	SYM01620
150	FORMAT (1X,19HILLEGAL INPUT CHAR ,I12)	SYM01630
	GO TO 430	SYM01640
160	IP=ICOMP+ICAP+ITALIC+IDUPLE	SYM01650
	IF (IC-27) 170,410,270	SYM01660
C	NUMBER OF SYMBOL	SYM01670
170	IC=IC+IP+IGREEK-ICAP*IDUPLE*24/(50*380)	SYM01680
180	I6=ISTART(IC)	SYM01690
	I5=30	SYM01700
	IF (LNGTH) GO TO 250	SYM01710
C	PRINT ALPHBETICAL CHARACTER	SYM01720
190	I8=IFLD(I5,3,ALFBET(I6))	SYM01730
C	TEST FOR END OF CHARACTER,I8=0	SYM01740
	IF (I8.EQ.0) GO TO 240	SYM01750
	IX=IFLD(I5-3,6,ALFBET(I6))	SYM01760
	IY=IFLD(I5-9,6,ALFBET(I6))	SYM01770
C	IF L=1, PRINT SYMBOL ON LINE,IF L=2,SUBSCRIPT,IF L=3,SUPERSCRIPIT	SYM01780
	GO TO (200,210,220), L	SYM01790
200	RSCALE=SCALE	SYM01800
	YOFF=0.	SYM01810
	GO TO 230	SYM01820
C	SUBSCRIPT	SYM01830
210	RSCALE=SCALE*0.5	SYM01840
	YOFF=-HEIGHT/4.	SYM01850
	GO TO 230	SYM01860
C	SUPERSCRIPIT	SYM01870
220	RSCALE=SCALE*0.5	SYM01880
	YOFF=HEIGHT*3./4.	SYM01890

C	ABOVE FACTORS NEEDED TO CORRECT OFFSET FOR DIFFERENT SIZE LETTERS	SYM01900
230	YI=FLOAT(IY-11)*RSCALE+YOFF	SYM01910
	XI=FLOAT(IX-10)*RSCALE	SYM01920
	CALL PLOT (X1+R(XI,YI),Y1+R(YI,-XI),I8)	SYM01930
	I5=45-I5	SYM01940
	IF (I5.EQ.30) I6=I6+1	SYM01950
	GO TO 190	SYM01960
240	IGREEK=0	SYM01970
250	X1=X1+R(WIDTH(IC)*RSCALE,0.0)	SYM01980
	Y1=Y1+R(0.,-WIDTH(IC)*RSCALE)	SYM01990
	DO 260 I=1,5	SYM02000
	OLDX(I)=OLDX(I+1)	SYM02010
260	OLDY(I)=OLDY(I+1)	SYM02020
	OLDX(6)=X1	SYM02030
	OLDY(6)=Y1	SYM02040
	RSCALE=SCALE	SYM02050
	L=1	SYM02060
	GO TO 430	SYM02070
270	IF (IC.GT.47) GO TO 280	SYM02080
	IC=IC+273	SYM02090
	IF (ICOMP.NE.0) IC=IC+20	SYM02100
	IF (ITALIC.NE.0) IC=IC+40	SYM02110
	IF (IDUPLE.NE.0) IC=IC+60	SYM02120
	GO TO 180	SYM02130
280	L1=IC-47	SYM02140
	GO TO (290,300,310,320,330, 340,350,360,380,390, 400), L1	SYM02150
C	SUBSCRIPT	SYM02160
290	L=2	SYM02170
	GO TO 430	SYM02180
C	SUPERSCRIFT	SYM02190
300	L=3	SYM02200
	GO TO 430	SYM02210
C	UPPER CASE	SYM02220
310	ICAP=0	SYM02230
	GO TO 430	SYM02240
C	LOWER CASE	SYM02250
320	ICAP=50	SYM02260
	GO TO 430	SYM02270
C	COMPLEX LETTERS	SYM02280
330	ICOMP=100	SYM02290
	ITALIC=0	SYM02300
	IDUPLE=0	SYM02310
	GO TO 430	SYM02320
C	GREEK LETTERS	SYM02330
340	IGREEK=26	SYM02340
	IF (IDUPLE.NE.0) IGREEK=0	SYM02350
	GO TO 430	SYM02360
C	SIMPLEX LETTERS	SYM02370
350	ICOMP=0	SYM02380
	ITALIC=0	SYM02390
	IDUPLE=0	SYM02400
	GO TO 430	SYM02410
C	BACKSPACE	SYM02420
360	DO 370 I=1,5	SYM02430
	IK=6-I	SYM02440
	OLDX(IK+1)=OLDX(IK)	SYM02450
370	OLDY(IK+1)=OLDY(IK)	SYM02460
	X1=OLDX(6)	SYM02470
	Y1=OLDY(6)	SYM02480
	GO TO 430	SYM02490
C	ITALIC	SYM02500
380	ITALIC=200	SYM02510
	ICOMP=0	SYM02520

	IDUPLE=0		SYM02530
	GO TO 430		SYM02540
C		DUPLEX	SYM02550
390	IDUPLE=380		SYM02560
	ICOMP=0		SYM02570
	ITALIC=0		SYM02580
	GO TO 430		SYM02590
C		END OF SCAN	SYM02600
400	GO TO 450		SYM02610
C		BLANK SPACE	SYM02620
410	X1=X1+R(20.*RSCALE,0.)		SYM02630
	Y1=Y1+R(0.,-20.*RSCALE)		SYM02640
	DO 420 I=1,5		SYM02650
	OLDX(I)=OLDX(I+1)		SYM02660
420	OLDY(I)=OLDY(I+1)		SYM02670
	OLDX(6)=X1		SYM02680
	OLDY(6)=Y1		SYM02690
	L=1		SYM02700
430	CONTINUE		SYM02710
440	CONTINUE		SYM02720
	IF(LNGTH) GO TO 450		SYM02730
	OLDX(6)=X1		SYM02740
	OLDY(6)=Y1		SYM02750
450	IF (LNGTH) XL=SQRT((X1-X)**2+(Y1-Y)**2)		SYM02760
	RETURN		SYM02770
	END		SYM02780

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SUBROUTINE LENGTH (XLEN,HEIGHT,TEXT,N)                                LEN00010
                                                                                   LEN00020
*****                                                                    LEN00030
                                                                                   LEN00040
LENGTH OF TEXT IS RETURNED IN XLEN                                       LEN00050
DIMENSION TEXT(1),IA(256),IB(58),OLDX(6),OLDY(6)                       LEN00060
COMMON /SAVE/ XL,OLDX,OLDY,IA,IB,NWORD,NCHAR,NCWD,IOUT,FIRST,LNGTHLEN00070
LOGICAL LNGTH,FIRST                                                    LEN00080
INTEGER TEXT                                                            LEN00090
LNGTH=.TRUE.                                                            LEN00100
CALL SYMBOL (0.,0.,HEIGHT,TEXT,0.,N)                                    LEN00110
XLEN=XL                                                                  LEN00120
LNGTH=.FALSE.                                                           LEN00130
RETURN                                                                    LEN00140
END                                                                      LEN00150
INTEGER FUNCTION STRIN(I,TEXT)                                          STR00010
                                                                                   STR00020
*****                                                                    STR00030
                                                                                   STR00040
DIMENSION TEXT(1)                                                       STR00050
INTEGER TEXT                                                            STR00060
STRIN=TEXT(I)                                                           STR00070
RETURN                                                                    STR00080
END                                                                      STR00090
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BLOCK DATA

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                                DAT00010
                                DAT00020
*****DAT00030
                                DAT00040
DIMENSION ISY110(60),ISY111(60),ISY112(8),JSTSYM(22),ISYMB0(128) DAT00050
DIMENSION IAL110(60),IAL111(60),IAL112(60),IAL113(60),IAL114(60), DAT00060
2 IAL115(60),IAL116(60),IAL117(60),IAL118(60),IAL119(60),IAL120(60)DAT00070
3,IAL121(60),IAL122(60),IAL123(60),IAL124(60),IAL125(60),IAL126(60)DAT00080
4,IAL127(60),IAL128(60) DAT00090
DIMENSION IAL129(60),IAL130(60),IAL131(60),IAL132(60),IAL133(60), DAT00100
2 IAL134(60),IAL135(60),IAL136(60),IAL137(60),IAL138(60),IAL139(60)DAT00110
3,IAL140(60),IAL141(60),IAL142(60),IAL143(60),IAL144(60),IAL145(60)DAT00120
4,IAL146(60),IAL147(60) DAT00130
DIMENSION IAL148(60),IAL149(60),IAL150(60),IAL151(60),IAL152(60), DAT00140
2 IAL153(60),IAL154(60),IAL155(60),IAL156(60),IAL157(60),IAL158(60)DAT00150
3,IAL159(60),IAL160(60),IAL161(60),IAL162(60),IAL163(60),IAL164(60)DAT00160
4,IAL165(60),IAL166(60) DAT00170
DIMENSION IAL167(60),IAL168(60),IAL169(60),IAL170(60),IAL171(60), DAT00180
2 IAL172(60),IAL173(60),IAL174(60),IAL175(60),IAL176(60),IAL177(60)DAT00190
3,IAL178(60),IAL179(60),IAL180(60),IAL181(60),IAL182(60),IAL183(60)DAT00200
4,IAL184(60),IAL185(60) DAT00210
DIMENSION IAL186(60),IAL187(60),IAL188(31),WID110(100),WID111(100)DAT00220
2,WID112(100),WID113(100),WID114(32),IST110(100),IST111(100), DAT00230
3 IST112(100),IST113(100),IST114(32) DAT00240
DIMENSION IFORT(47),IA(256),IB(58),ISPEC(11),OLDX(6),OLDY(6) DAT00250
DIMENSION IALFBE(4711),WIDTH(432),ISTART(432) DAT00260
COMMON /IALPH/ WIDTH,IALFBE,ISTART,ISYMB0,JSTSYM DAT00270
COMMON /SAVE/ XL,OLDX,OLDY,IA,IB,NWORD,NCHAR,NCWD,IOUT,FIRST,LNGTHDAT00280
LOGICAL FIRST,LNGTH DAT00290
EQUIVALENCE (IB(1),IFORT(1)), (IB(48),ISPEC(1)) DAT00300
EQUIVALENCE (IALFBE(1),IAL110(1)), (IALFBE(61),IAL111(1)), DAT00310
2 (IALFBE(121),IAL112(1)), (IALFBE(181),IAL113(1)), (IALFBE(241), DAT00320
3 IAL114(1)), (IALFBE(301),IAL115(1)), (IALFBE(361),IAL116(1)), DAT00330
4 (IALFBE(421),IAL117(1)), (IALFBE(481),IAL118(1)), (IALFBE(541), DAT00340
5 IAL119(1)), (IALFBE(601),IAL120(1)), (IALFBE(661),IAL121(1)), DAT00350
6 (IALFBE(721),IAL122(1)), (IALFBE(781),IAL123(1)), (IALFBE(841), DAT00360
7 IAL124(1)), (IALFBE(901),IAL125(1)), (IALFBE(961),IAL126(1)), DAT00370
8 (IALFBE(1021),IAL127(1)), (IALFBE(1081),IAL128(1)) DAT00380
EQUIVALENCE (IALFBE(1141),IAL129(1)), (IALFBE(1201),IAL130(1)), DAT00390
2 (IALFBE(1261),IAL131(1)), (IALFBE(1321),IAL132(1)), (IALFBE(1381)DAT00400
3,IAL133(1)), (IALFBE(1441),IAL134(1)), (IALFBE(1501),IAL135(1)), DAT00410
4 (IALFBE(1561),IAL136(1)), (IALFBE(1621),IAL137(1)), (IALFBE(1681)DAT00420
5,IAL138(1)), (IALFBE(1741),IAL139(1)), (IALFBE(1801),IAL140(1)), DAT00430
6 (IALFBE(1861),IAL141(1)), (IALFBE(1921),IAL142(1)), (IALFBE(1981)DAT00440
7,IAL143(1)), (IALFBE(2041),IAL144(1)), (IALFBE(2101),IAL145(1)), DAT00450
8 (IALFBE(2161),IAL146(1)), (IALFBE(2221),IAL147(1)) DAT00460
EQUIVALENCE (IALFBE(2281),IAL148(1)), (IALFBE(2341),IAL149(1)), DAT00470
2 (IALFBE(2401),IAL150(1)), (IALFBE(2461),IAL151(1)), (IALFBE(2521)DAT00480
3,IAL152(1)), (IALFBE(2581),IAL153(1)), (IALFBE(2641),IAL154(1)), DAT00490
4 (IALFBE(2701),IAL155(1)), (IALFBE(2761),IAL156(1)), (IALFBE(2821)DAT00500
5,IAL157(1)), (IALFBE(2881),IAL158(1)), (IALFBE(2941),IAL159(1)), DAT00510
6 (IALFBE(3001),IAL160(1)), (IALFBE(3061),IAL161(1)), (IALFBE(3121)DAT00520
7,IAL162(1)), (IALFBE(3181),IAL163(1)), (IALFBE(3241),IAL164(1)), DAT00530
8 (IALFBE(3301),IAL165(1)), (IALFBE(3361),IAL166(1)) DAT00540
EQUIVALENCE (IALFBE(3421),IAL167(1)), (IALFBE(3481),IAL168(1)), DAT00550
2 (IALFBE(3541),IAL169(1)), (IALFBE(3601),IAL170(1)), (IALFBE(3661)DAT00560
3,IAL171(1)), (IALFBE(3721),IAL172(1)), (IALFBE(3781),IAL173(1)), DAT00570
4 (IALFBE(3841),IAL174(1)), (IALFBE(3901),IAL175(1)), (IALFBE(3961)DAT00580
5,IAL176(1)), (IALFBE(4021),IAL177(1)), (IALFBE(4081),IAL178(1)), DAT00590
6 (IALFBE(4141),IAL179(1)), (IALFBE(4201),IAL180(1)), (IALFBE(4261)DAT00600
7,IAL181(1)), (IALFBE(4321),IAL182(1)), (IALFBE(4381),IAL183(1)), DAT00610
8 (IALFBE(4441),IAL184(1)), (IALFBE(4501),IAL185(1)) DAT00620
EQUIVALENCE (IALFBE(4561),IAL186(1)), (IALFBE(4621),IAL187(1)), DAT00630

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2 (IALFBE(4681),IAL188(1))	DAT00640
EQUIVALENCE (WIDTH(1),WID110(1)), (WIDTH(101),WID111(1)),	DAT00650
2 (WIDTH(201),WID112(1)), (WIDTH(301),WID113(1)), (WIDTH(401),	DAT00660
3 WID114(1))	DAT00670
EQUIVALENCE (ISTART(1),IST110(1)), (ISTART(101),IST111(1)),	DAT00680
2 (ISTART(201),IST112(1)), (ISTART(301),IST113(1)), (ISTART(401),	DAT00690
3 IST114(1))	DAT00700
EQUIVALENCE (ISYMB0(1),ISY110(1)), (ISYMB0(61),ISY111(1)),	DAT00710
2 (ISYMB0(121),ISY112(1))	DAT00720
DATA IA /256*511/	DAT00730
DATA IFORT /1HA,1HB,1HC,1HD,1HE,1HF,1HG,1HH,1HI,1HJ,1HK,1HL,1HM,	DAT00740
2 1HN,1HO,1HP,1HQ,1HR,1HS,1HT,1HU,1HV,1HW,1HX,1HY,1HZ,1H ,1HO,1HI,	DAT00750
3 1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9,1H+,1H-,1H/,1H=,1H(,1H),1H*,1H,,	DAT00760
4 1H.,1H\$/	DAT00770
*****	DAT00780
*****	DAT00790
THE IMPLEMENTOR MUST SUPPLY THE FOLLOWING TWO CARDS TO SUIT THE	DAT00800
INSTALLATION. NWORD=BITS/WORD,NCHAR=BITS/CHARACTER	DAT00810
DATA ISPEC /1H\,1H",1H@,1H#,1H&,1H^,1H%,1H?,1H!,1H;,1H:/	DAT00820
DATA NWORD /36/ ,NCHAR /6/ ,IOUT /6/	DAT00830
*****	DAT00840
*****	DAT00850
*****	DAT00860
DATA FIRST /.TRUE./ ,LNGTH /.FALSE./	DAT00870
DATA ISY110 /471149226,357246358,315959338,336592896,470820906,	DAT00880
2 345320100,357443862,327886236,315762474,336920576,470820906,	DAT00890
3 355313115,336920576,470493226,449850016,0,455911911,456370649,0,	DAT00900
4 471149216,336274848,336930848,0,470493226,357574048,336920576,	DAT00910
5 449522346,315959958,0,470820906,355641947,336274907,317892650,0,	DAT00920
6 456370208,336279584,351502336,481470811,325953253,347256234,	DAT00930
7 326284694,325958294,346929184,357892096,449850016,470493226,	DAT00940
8 455911911,485271143,0,450177706,315304598,315949056,470493226,0,	DAT00950
9 470820906,355313115,336935525,336274917,355631104,470853600/	DAT00960
DATA ISY111 /336570464,336625664,468592477,328181537,330409956,	DAT00970
2 338831587,345024799,342796380,334364672,466265814,319563163,	DAT00980
3 313468258,315794984,326444971,341158250,353643173,359738078,	DAT00990
4 357411352,346761365,332038144,465905227,312910991,300491605,	DAT01000
5 292332190,290530023,297116654,307799411,322611126,341518837,	DAT01010
6 360295345,372714731,380874146,382676313,376089682,365406925,	DAT01020
7 350595210,331677696,468592477,328181537,330409956,338831587,	DAT01030
8 345024799,342796380,334378847,330344289,466560930,468625379,	DAT01040
9 470722595,472819811,474949794,477079777,0,462300964,345123100,	DAT01050
* 328087389,330413981,332511197,334608413,336705629,338802845/	DAT01060
DATA ISY112 /340900061,342982656,470623971,347187226,464594973,	DAT01070
2 342964256,334571552,338755584/	DAT01080
DATA JSTSYM /1,5,11,14,17,20,24,27,30,35,38,45,50,53,55,60,63,70,	DAT01090
2 81,98,113,123/	DAT01100
DATA IAL110 /443556555,443557579,432612882,0,433070987,433071584,	DAT01110
2 323987166,328083226,325854871,317404054,317400725,325723922,	DAT01120
3 327657165,323364299,298156032,462268125,321889760,309339231,	DAT01130
4 300852123,296493907,298329038,304489675,317040204,325527312,0,	DAT01140
5 433070987,433071456,319792797,325953304,327788240,323429900,	DAT01150
6 312845195,0,433070987,433071840,432743830,432383691,0,433070987,	DAT01160
7 433071840,432743830,0,462268125,321889760,309339231,300852123,	DAT01170
8 296493907,298329038,304489675,317040204,325527312,327792083,	DAT01180
9 327778304,433070987,462432011,432744214,0,433070987,0,449848720/	DAT01190
DATA IAL111 /312911116,306553867,298197837,294134546,0,433070987,	DAT01200
2 462431122,443262731,0,433070987,432383627,0,433070987,433071499,	DAT01210
3 466625931,466626443,0,433070987,433071883,462432011,0,443556959,	DAT01220
4 300852123,296493907,298329038,304489675,317040204,325527312,	DAT01230
5 329885166,328050397,321889760,309329920,433070987,433071584,	DAT01240
6 3239871528,328083225,325822102,317367189,0,443556959,300852123,	DAT01250
	DAT01260

7 296493907,298329038,304489675,317040204,325527312,329885528, DAT01270
8 328050397,321889760,309343631,327450624,433070987,433071584, DAT01280
9 323987166,328083226,325854871,317399958,447424267,0,460236383/, DAT01290
DATA IAL112 /315630752,300917597,296592281,300688471,317367892, DAT01300
2 323593937,325527116,314942603,300294990,0,441459851,426780256,0, DAT01310
3 433070993,300360780,310748555,321267406,327722784,0,426779851, DAT01320
4 460334283,0,428876875,449848395,449849035,470820555,0,430974667, DAT01330
5 460333899,0,426779862,308655840,309002240,460333899,430974688, DAT01340
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4	319464919,315368729,302818200,296461141,298460179,313042384,	DAT03610
5	319271766,298492948,313075153,319301133,317072715,304456652,	DAT03620
6	298230607,296067981,0,435168207,302392459,310748556,317142048,	DAT03630
7	302490700,306557721,311197696,434938830,302392523,312845836,	DAT03640
8	323433497,302457932,308655769,323335897,325432089,302822873,	DAT03650
9	325891723,331710464,430744779,432841933,455910603,426550361,	DAT03660
*	447522521,0,432841867,434939022/	DAT03670
	DATA IAL136 /449619083,449619595,451716750,466396811,426550425,	DAT03680
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3	428188811,449160971,0,432841995,434939149,458007819,306422789,	DAT03700
4	297935684,293774150,297972505,307017113,327974912,453813067,	DAT03710
5	455910283,432841557,296527449,430286411,321365515,0,445424728,	DAT03720
6	300622740,296264526,298198091,308651340,319268498,327886681,	DAT03730
7	445424792,302719956,298361742,300295243,445425049,319563350,	DAT03740
8	325527308,329627033,317466134,323430092,329623435,0,451945759,	DAT03750
9	307143705,300622738,296100612,451945823,309240921,302719954,	DAT03760
*	298197828,451946080,326084382/	DAT03770
	DATA IAL137 /328050393,323757527,309048928,326051547,323790424,	DAT03780

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3	300430551,315303444,321463887,319202764,312836096,426451800,	DAT03800
4	300721241,309077271,313140560,310780996,428581784,306980119,	DAT03810
5	462202582,323626317,306455556,460105366,321529165,0,451683673,	DAT03820
6	309109784,298492754,296199053,300295243,308651404,319268434,	DAT03830
7	321562135,311305438,309339425,315663904,323957977,304882645,	DAT03840
8	298394510,300299467,312878543,319366678,317465947,311338271,	DAT03850
9	313533920,323944448,455812568,313304153,300688342,304751891,	DAT03860
*	439133208,302720148,311014675,300491600,296166284,304456971/	DAT03870
	DATA IAL138 /314975758,445228050,298328974,300295243,0,447751391,	DAT03880
2	307176605,309208475,325953244,319661337,304849812,296264527,	DAT03890
3	298230859,310682951,312648964,306324549,449651863,300557201,	DAT03900
4	298296269,304447488,426418967,298624089,306979990,304686027,	DAT03910
5	437036120,304817170,298169426,309011800,317498969,325854999,	DAT03920
6	327821007,318912089,325822164,323462596,0,426418967,298624089,	DAT03930
7	306979990,304653390,306586827,437036120,304817169,302457932,	DAT03940
8	308651339,317072974,325625620,330082141,328181408,319825310,	DAT03950
9	315499993,321595092,331953612,321365649,325723929,328115935,	DAT03960
*	324009984,437035922,296166220,298165323,308716815/	DAT03970
	DATA IAL139 /439133138,298263436,300253184,437035787,439133003,	DAT03980
2	458008280,327952089,321693144,308946003,300528723,308880716,	DAT03990
3	314946643,306783500,312845771,321267407,0,430973920,305112222,	DAT04000
4	309208654,323364555,435168350,307111438,321267403,327529753,	DAT04010
5	293975321,296058880,439132868,441230084,439034896,302425227,	DAT04020
6	310748556,319235729,462202446,321267339,329623501,336050009,	DAT04030
7	323430028,325419008,437035915,439133203,300360587,460105365,	DAT04040
8	319338265,325789332,319333775,308716620,298169177,304906240,	DAT04050
9	447751391,307176605,309208475,321762715,307045401,300655573,	DAT04060
*	304719122,317273499,309142617,302752789,306816274,445195281/	DAT04070
	DATA IAL140 /298328910,296100810,310650183,312648900,304231698,	DAT04080
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3	300295243,308651404,319268434,321562135,317465945,309114073,	DAT04100
4	304882645,298394510,300299467,312878543,319366678,317456384,	DAT04110
5	443294667,443294731,455878219,455878283,428549016,304916377,	DAT04120
6	428549015,304883608,0,432546765,302392459,310748620,321365650,	DAT04130
7	323659351,319563161,311207000,300589970,289551627,314975759,	DAT04140
8	321463894,319567129,306979861,300491460,0,464299225,302785429,	DAT04150
9	296297295,298230732,304456907,314975759,321463893,319530456,	DAT04160
*	313308377,304882645,298394510,300299467/	DAT04170
	DATA IAL141 /312878543,319366678,317470168,330039296,447489163,	DAT04180
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3	298624089,306979990,302523405,306557977,304882774,300426189,	DAT04200
4	302392459,308651404,319235729,325723863,323790424,323725012,	DAT04210
5	457746135,0,441197591,298492754,296199053,300295243,310748620,	DAT04220
6	323430161,329918295,325887577,317433171,308749316,430416845,	DAT04230
7	304489740,317105807,327726935,325854808,317400403,308716612,0,	DAT04240
8	428647321,302785622,314811845,318911385,300688406,312714629,	DAT04250
9	318908036,460105367,319431561,293806788,0,456139972,458237060,	DAT04260
*	426418967,298624089,306979990/	DAT04270
	DATA IAL142 /304653390,308684172,319203024,329888793,304882774,	DAT04280
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3	309077145,302785429,296297295,298197963,304456908,312976786,	DAT04300
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5	329754514,332048216,327984856,330016661,447194509,317072972,	DAT04320
6	325494607,0,451945099,451945995,449783243,432580049,419799947,	DAT04330
7	444966539,0,443556683,445653899,437266144,332376029,334342040,	DAT04340
8	330016406,460334943,332310427,330049303,323695702,323692309,	DAT04350
9	329885521,327624332,314942091,457909973,327788305,325527116,	DAT04360
*	314933248,462366558,332408666,330180382/	DAT04370
	DATA IAL143 /326084192,315630815,305046490,298558291,296231821,	DAT04380
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3	298329037,302392459,0,443556683,445653899,437266016,328181598,	DAT04400
4	332244887,329885391,321299916,308650635,456140511,328148827,	DAT04410

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7 445653899,453846418,437266400,332212128,439035350,423994443,0, DAT04440
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9 298558291,296231821,300295307,310748620,321332946,449848607, DAT04460
* 307143706,300655507,298329037/ DAT04470
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3 423994443,451258251,0,443556683,445653899,437265888,423994443,0, DAT04500
4 456140047,308716684,302359435,294003406,292037393,296231695, DAT04510
5 454042831,306619403,447751968,0,443556683,445653899,472917011, DAT04520
6 451651275,449554059,437265888,464529632,423994443,451258187,0, DAT04530
7 443556683,445653899,437265888,423994955,325625355,0,443556683, DAT04540
8 443557131,445654349,472917259,472917707,475014923,437265696, DAT04550
9 472918368,423994379,453355467,0,443556683,443557518,443459211/ DAT04560
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4 298427280,300328011,444966284,319235729,325723928,328050398, DAT04600
5 321912832,443556683,445653899,437266208,334473245,336439256, DAT04610
6 329983573,304789280,332376029,334342040,327886421,423994443,0, DAT04620
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9 302851031,298427280,300328011,444966284,319235729,325723928, DAT04650
* 328050398,321926093,300360720,306750673,313009550/ DAT04660
DATA IAL146 /314811846,321070728,323270030,316941831,321103496,0, DAT04670
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3 304821984,330278813,332244824,327919254,449521173,321529484, DAT04690
4 325429067,331786126,455747277,327558988,331788939,304447488, DAT04700
5 464463774,334505882,332277598,328181344,313533599,302949403, DAT04710
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7 314942603,300295053,296198993,293970765,298221568,451945547, DAT04730
8 454042763,439362458,303048672,332212128,432383307,0,441459669, DAT04740
9 298361742,300295307,314943052,325527313,336606432,302687185, DAT04750
* 300360716,306557920,315635552,342884352,437265483/ DAT04760
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2 443556941,458236939,458237451,460334669,475014667,435168672, DAT04780
3 468724064,0,439363083,441460299,468722379,435168608,460335200, DAT04790
4 421897163,447063755,0,437265686,304460896,313205899,468723030, DAT04800
5 433071392,460335200,432383307,0,466625227,468722443,441459674, DAT04810
6 305145824,426092107,325625355,0,466527124,331710464,432973716, DAT04820
7 298156032,455747095,317465945,309109784,298492754,296199053, DAT04830
8 300295243,308651404,319235665,323692187,321857055,315630816, DAT04840
9 305112094,302949469,305083609,304882645,298394510,300299467, DAT04850
* 312878542,319333974/ DAT04860
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3 300295307,312845772,443327576,300622739,298329037,302392459, DAT04890
4 432612754,0,466625433,331953040,331887499,331710464,433072025, DAT04900
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6 309077080,300655509,298427345,304620752,313042322,321595096, DAT04920
7 330082265,0,468821922,334538786,336701412,330442467,321955359, DAT04930
8 317597080,310781128,306394786,321922588,315106636,310682823, DAT04940
9 304260036,295838469,293806919,298001221,0,468821922,334538786, DAT04950
* 336701412,330442467,321955359/ DAT04960
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3 302785493,300524560,306652493,317105806,327690067,329951000, DAT04990
4 323823067,313360384,470394833,329787088,321431058,313206039, DAT05000
5 306979864,298558293,296330129,302523536,310945106,319497815, DAT05010
6 325855064,334211093,336166912,449717643,432678804,432383883,0, DAT05020
7 449717643,432940956,432678804,0,432908045,462267277,0,451847580, DAT05030
8 317564444,317633428,336213453,314975691,319169997,0,439493700, DAT05040

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*	434807700,300524564/	DAT05060
	DATA IAL150 /300580864,430744665,317109273,317044772,317030400,	DAT05070
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3	344109956,344074635,341966848,447751327,302916570,298558290,	DAT05090
4	296166284,302359691,312878543,319333972,323790493,321889760,	DAT05100
5	313537888,309306460,302851031,298394510,300295179,440771852,	DAT05110
6	315074001,319432281,321824287,317731798,319488000,443688035,	DAT05120
7	303113184,300885020,304981145,306947093,439460897,303015005,	DAT05130
8	307111130,309077142,298460306,308815054,306586699,302294023,	DAT05140
9	304264211,306750607,304522252,300229576,302195781,308412416,	DAT05150
*	435299427,307307744,309273756,304981017,302752917,439461025,	DAT05160
1	307209309/	DAT05170
	DATA IAL151 /302916570,300688406,311043090,300426190,302392395,	DAT05180
2	306488455,304264339,302556175,304522380,308618440,306390085,	DAT05190
3	300023808,462169818,321758619,311239897,306914451,308847952,	DAT05200
4	319301265,325694875,311207126,308913425,313014043,325691089,	DAT05210
5	329787344,338241685,340502618,336471966,328181344,315630815,	DAT05220
6	305079260,298656599,296362897,300393549,308684171,321234700,	DAT05230
7	331786190,464365331,327722832,0,434938776,296428372,298361997,	DAT05240
8	308654932,298394766,308651209,306390020,300032901,295936842,	DAT05250
9	298263570,306881880,317498969,327952214,329852686,323364363,	DAT05260
*	317040012,315041231,319235533,455911128,327886610,325527180/	DAT05270
	DATA IAL152 /0,458008082,317138380,319137483,329688975,460105298,	DAT05280
2	319235596,321238546,319464920,313304281,302785429,296297295,	DAT05290
3	298230732,304456907,312878543,319370457,304882645,298394510,	DAT05300
4	300285952,441459603,298329037,302396640,300528595,302720152,	DAT05310
5	311207321,319563351,323659410,321365452,310748299,302392271,	DAT05320
6	300529176,321594962,319268236,310752224,309329920,453715477,	DAT05330
7	321562198,319563161,309109784,298492754,296199053,300295243,	DAT05340
8	308651404,319272153,304882645,298394510,300285952,462431762,	DAT05350
9	317138380,319137483,329688975,464528978,319235596,321238546,	DAT05360
*	319464920,313304281,302785429,296297295,298230732,304456907/	DAT05370
	DATA IAL153 /312878543,319370457,304882645,298394510,300299872,	DAT05380
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3	296297295,298230732,304456907,314975758,443327576,300589970,	DAT05400
4	298263500,0,456107550,321824414,323987040,317728095,311370972,	DAT05410
5	307012555,298033989,451945822,311305432,304587787,300163974,	DAT05420
6	295871172,287449605,285418055,289612357,432842265,0,460105163,	DAT05430
7	314844421,304227204,293774022,291742472,295936774,458007947,	DAT05440
8	312747205,304231954,319464920,313304281,302785429,296297295,	DAT05450
9	298230732,304456907,312878543,319370457,304882645,298394510,	DAT05460
*	300285952,441459467,443556683,434709590,309077337/	DAT05470
	DATA IAL154 /317498968,323724949,319268364,321238489,321627733,	DAT05480
2	317171148,319137483,329688975,435168480,0,443557023,309273887,	DAT05490
3	309342933,294364057,304915608,306881551,302392395,437036120,	DAT05500
4	304784335,300295179,308651341,315064320,445654239,311371103,	DAT05510
5	311440149,296461273,307012824,308978699,300163974,295871172,	DAT05520
6	287449605,285418055,289612357,439133336,306881483,298066758,	DAT05530
7	291635200,441459467,443556683,457975383,323692247,325854873,	DAT05540
8	321693144,308946003,300528723,308880716,314946643,306783500,	DAT05550
9	312845771,321267407,435168480,0,441459602,296166220,298165323,	DAT05560
*	308716815,443556818,298263436,300266464,309329920/	DAT05570
	DATA IAL155 /426418967,298624089,306979990,304686027,437036120,	DAT05580
2	304817170,298169426,309011800,317498969,325854999,327853643,	DAT05590
3	455911127,325756427,459876182,334243929,342665560,348891541,	DAT05600
4	344434956,346405081,346794325,342337740,344304075,354855567,0,	DAT05610
5	426418967,298624089,306979990,304686027,437036120,304817170,	DAT05620
6	298169426,309011800,317498969,325854999,327853711,323364555,	DAT05630
7	455911127,325756495,321267339,329623501,336035840,443327512,	DAT05640
8	298492754,296199053,300295243,308651404,319268434,321562135,	DAT05650
9	317465945,309114073,304882645,298394510,300299467,312878543,	DAT05660
*	319366678,317456384,426418967,298624089,306979990,304685892/	DAT05670

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3 325789394,323462668,314946116,302120960,458007812,460105028,	DAT05700
4 453584405,317465945,309109784,298492754,296199053,300295243,	DAT05710
5 308651430,317171218,443327576,300589970,298263500,438445572,0,	DAT05720
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7 298169426,309011800,317498969,323757719,321594903,321650688,	DAT05740
8 453748246,321594967,319563097,307012568,298558357,300557712,	DAT05750
9 317174678,300590481,317203917,314975435,302359372,294036238,	DAT05760
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3 302392459,310748556,319235730,462202514,321332812,323331915,	DAT05800
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5 306979989,302490637,306557977,304882773,300393421,302392459,	DAT05820
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8 310748556,319235664,460105296,321300108,327526283,335947918,	DAT05850
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3 310814027,0,426418967,298624089,306979989,302490637,306557977,	DAT05900
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5 319038853,308421636,297968454,295936904,300131206,462202379,	DAT05920
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3 298525524,296297360,302458187,432547021,312845705,314811717,	DAT06000
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5 307246240,306328725,304686212,308880533,428647320,302818202,	DAT06020
6 294433561,319599897,315368985,315434265,0,434938776,300655640,	DAT06030
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8 298197965,302392330,300163975,0,435168158,300491806,300954590,	DAT06050
9 300692429,298197963,302392269,0,432939995,298656603,296625054,	DAT06060
* 300917856/	DAT06070
DATA IAL160 /311436767,319759964,321725976,317433045,308884768,	DAT06080
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3 468722507,441459998,311305434,304915417,296592221,298820640,	DAT06100
4 307242271,317662878,330278880,459875921,319268365,323331851,	DAT06110
5 331753422,333981522,325648384,468461463,334178327,336340953,	DAT06120
6 332179288,327886481,319235468,310748235,298197838,296264595,	DAT06130
7 311141785,317564381,315598112,307209309,304981144,311076430,	DAT06140
8 325461899,333817868,335983691,300295054,298361811,304788571,	DAT06150
9 307013262,327559051,0,437035992,302752856,302822221,294003531,	DAT06160
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3 307209568,321922847,330213211,327984856,313205973,308913426,	DAT06200
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5 306610176,430482259,298525719,306947350,319399570,327755667,	DAT06220
6 334148435,298492950,306914581,319366801,327722898,334145495,0,	DAT06230
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8 323462861,325432218,323433309,296592281,323397323,441131922,	DAT06250
9 296231758,298197835,430449612,432612240,300360652,296072531,	DAT06260
* 323761693,319628888,325854938,321758749/	DAT06270
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3 334112399,432678868,0,454042756,456139844,445424664,298525523,	DAT06300

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5	311211289,304882646,298427280,300360780,308655499,321267406,	DAT06320
6	327722772,325789272,317489152,441459806,307111134,307246240,	DAT06330
7	306787478,304751824,306652240,308946070,441001092,440673350,	DAT06340
8	306324678,306459471,298591257,298656537,428647961,445425048,	DAT06350
9	319595930,311210763,298132491,298197771,428189195,444966282,	DAT06360
*	319137164,310738944,443556895,298722135,296362895,302392523/	DAT06370
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3	323888794,321660373,296068811,0,435168928,311174616,321627798,	DAT06400
4	325691089,323429900,312845451,300295053,296189952,451945298,	DAT06410
5	327759328,317030400,456139744,298558424,307012953,319563414,	DAT06420
6	325691089,323429900,312845451,300295053,296189952,458139231,	DAT06430
7	315630880,305112028,298558354,300360780,310748491,319170190,	DAT06440
8	325625554,323659287,313271576,304849877,298385408,460334155,	DAT06450
9	430974688,0,441459679,298754971,300721240,313239062,323626706,	DAT06460
*	325559949,321267083,306553804,298230607/	DAT06470
	DATA IAL164 /296297364,302720215,317466201,323856029,321889696,	DAT06480
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3	303015136,311436767,321824409,323626575,317072651,306553804,	DAT06500
4	298254336,451847627,432678932,0,432678932,0,466756356,0,432777239	DAT06510
5	432580625,0,447882466,305112027,298525586,300328009,308487492,0,	DAT06520
6	431104994,305112283,311108882,308716617,300098372,0,441263246,	DAT06530
7	430679505,451650385,0,436609995,298197965,302392330,300163975,0,	DAT06540
8	434545548,300262412,300318720,441590919,449979783,460236383,	DAT06550
9	315630752,300917597,296592281,300688471,317367892/	DAT06560
	DATA IAL165 /323593937,325527116,314942603,300294990,0,443556895,	DAT06570
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3	319792480,309343456,305112094,300819351,298460111,302425164,	DAT06590
4	308655435,317072909,321365652,323724892,319759839,313524224,	DAT06600
5	437134493,313533771,445621515,436577867,0,432939995,298656603,	DAT06610
6	296625054,300917920,315631199,323954396,325920408,317400212,	DAT06620
7	302621585,296166219,449848863,321857180,323823192,315303060,	DAT06630
8	430351246,302458188,319170189,325530638,312845899,323364558,	DAT06640
9	325582848,432939995,298656603,296625054,300917920,315631199,	DAT06650
*	323921562,321660311,309048736,319792733,321725976/	DAT06660
	DATA IAL166 /315340183,319497876,325658319,323397196,314942603,	DAT06670
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3	314933248,449783179,451945931,451945233,327726283,323321856,	DAT06690
4	435168086,430646232,307012953,319563414,325691089,323429900,	DAT06700
5	312845451,300295053,296198992,298361808,298300761,317466198,	DAT06710
6	323593873,321332684,312849376,321926111,311404128,0,456042012,	DAT06720
7	321758876,323921503,317728032,305112029,298689367,296264590,	DAT06730
8	302392523,312845836,323430097,325658261,319530328,311174231,	DAT06740
9	300589970,445654175,302949339,298558353,300360780,308655435,	DAT06750
*	317072974,323528338,321562071,313262080,430973786,430842782/	DAT06760
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3	441459679,298754970,300688535,315336280,323823261,321889696,	DAT06790
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5	315634839,300622741,296330063,298230732,306554251,321267341,	DAT06810
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7	306558347,319170125,323462803,321562134,315326464,458008150,	DAT06830
8	317334803,308913172,298525529,296559517,303015136,313533983,	DAT06840
9	323921626,325723792,321332684,310748235,300295054,298296272,	DAT06850
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 3 319432274,321365517,317072715,0,458204427,460334411,460333841, DAT07090
 4 327712768,443556758,443557728,443524639,330314646,300655768, DAT07100
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 3 309343327,300819351,298460111,304493581,308684108,319206860, DAT07390
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 6 307242400,319792734,323888794,321660373,298169243,300786652, DAT07420
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6 306553804,298230607,296297364,302720151,315368985,321758813,	DAT07620
7 319796830,315597983,300888974,304494028,323420160,455812564,	DAT07630
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9 302195588,0,441459807,308978836,441459860,441459935,304784532,	DAT07760
* 430875549/	DAT07770
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* 445654795,434677329,432547472/	DAT07870
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4 314947419,329623435,466626443,0,433070987,435069899,298169309,	DAT08110
5 327529376,325531360,325531360,328214283,0,443556959,300852123,	DAT08120
6 296493907,298329038,304489675,317040204,325527312,329885528,	DAT08130
7 328050397,321889760,309343519,305079259,298591123,300426317,	DAT08140
8 310781324,321300176,327788312,325953118,315598111,0,433070987,	DAT08150
9 435135435,298169248,317728351,323954396,325887639,321594837,	DAT08160
* 300594143,317695582/	DAT08170
DATA IAL181 /323888793,321627606,300613632,443556959,300852123,	DAT08180
2 296493907,298329038,304489675,317040204,325527312,329885528,	DAT08190

3 328050397,321889760,309343519,305079259,298591123,300426317, DAT08200
 4 310781324,321300176,327788312,325953118,315598111,449259209, DAT08210
 5 327464334,317138697,0,433070987,435135435,298169248,315631199, DAT08220
 6 323954396,325887639,321594773,300594143,315598430,323888793, DAT08230
 7 321627542,300627221,323331787,447391435,0,460236383,315630752, DAT08240
 8 300917597,296592281,300688471,315270676,321496721,323429965, DAT08250
 9 314975372,302425038,296171229,321824286,315597983,300884893, DAT08260
 * 298689497,304883094,319465107,325625550,321267083/ DAT08270
 DATA IAL182 /306553804,296157184,441427083,443524299,306557728, DAT08280
 2 321922655,428876575,321880064,433070993,300360780,310748555, DAT08290
 3 321267406,327722784,433071072,300459022,304522508,314975821, DAT08300
 4 323430097,326117152,0,428877067,428876640,310851360,326116622, DAT08310
 5 462431499,0,428876939,428876640,306656736,306656733,306558429, DAT08320
 6 327529952,327628960,338700046,475014923,0,430974603,325432160, DAT08330
 7 298854091,460334752,296072928,298165067,0,428877014,308651275, DAT08340
 8 428876640,311113440,324019414,460334358,310738944,458236747, DAT08350
 9 460333963,430974688,430973791,323990412,325461707,430286539,0, DAT08360
 * 455910987,323335769/ DAT08370
 DATA IAL183 /323790475,455812568,313304217,302785430,296330065, DAT08380
 2 298263564,306554187,317072974,455812440,306979863,300622739, DAT08390
 3 298361806,302425228,312878670,0,433070987,300266400,300950475, DAT08400
 4 434840664,309110169,319563414,325691089,323429900,314942667, DAT08410
 5 304489422,434840792,315368983,321595027,323528270,319202700, DAT08420
 6 308683726,0,455812568,313304217,302785430,296330065,298263564, DAT08430
 7 306554187,317072974,455812629,317433176,306979863,300622739, DAT08440
 8 298361806,302425228,312878541,319268430,0,456140363,323335776, DAT08450
 9 324019851,455812568,313304217,302785430,296330065,298263564, DAT08460
 * 306554187,317072974,455812440,306979863/ DAT08470
 DATA IAL184 /300622739,298361806,302425228,312878670,0,432612946, DAT08480
 2 321562135,317465945,307012632,298525523,296264590,302392459, DAT08490
 3 312845772,321336211,319399445,317433176,306979863,300622739, DAT08500
 4 298361806,302425228,312878541,319268430,0,447751392,305112092, DAT08510
 5 302359627,447751519,309306462,441427036,304460633,311207192, DAT08520
 6 430744408,311164928,458008153,321201671,316876101,308454470, DAT08530
 7 302228359,458008202,321103301,312616068,302162823,455812568, DAT08540
 8 313304217,302785430,296330065,298263564,306554187,317072974, DAT08550
 9 455812440,306979863,300622739,298361806,302425228,312878670,0, DAT08560
 * 433070987,300266400,300950475,434807960/ DAT08570
 DATA IAL185 /311207385,321660565,323335125,306947352,315368983, DAT08580
 2 321562187,323321856,433070943,296690589,300852254,303014880, DAT08590
 3 298857375,298787806,300917663,432841611,300266393,300721099,0, DAT08600
 4 433070943,296690589,300852254,303014880,298857375,298787806, DAT08610
 5 300917663,432841604,300037017,300721092,0,433070987,300266400, DAT08620
 6 300950475,458008153,300398233,300364946,319137419,443131531,0, DAT08630
 7 433070987,300266400,300950475,0,432841611,300266393,300721099, DAT08640
 8 434807960,311207385,321660565,323335125,306947352,315368983, DAT08650
 9 321562187,323335829,330049497,340568344,346728779,457877335, DAT08660
 * 334243928,342599957,344303947/ DAT08670
 DATA IAL186 /0,432841611,300266393,300721099,434807960,311207385, DAT08680
 2 321660565,323335125,306947352,315368983,321562187,323321856, DAT08690
 3 441230360,298525523,296264590,302392459,312845772,321332881, DAT08700
 4 323593814,317465945,307016856,302752726,298427281,300360717, DAT08710
 5 306586956,317105678,321431123,319497687,313271448,0,432841604, DAT08720
 6 300037017,300721092,434840664,309110169,319563414,325691089, DAT08730
 7 323429900,314942667,304489422,434840792,315368983,321595027, DAT08740
 8 323528270,319202700,308683726,0,455910980,323106393,323790468, DAT08750
 9 455812568,313304217,302785430,296330065,298263564,306554187, DAT08760
 * 317072974,455812440,306979863,300622739/ DAT08770
 DATA IAL187 /298361806,302425228,312878670,0,432841611,300266393, DAT08780
 2 300721099,434742294,306980121,317502419,302687383,311174616, DAT08790
 3 317489152,453715416,311207001,298591062,298460179,313042384, DAT08800
 4 449357263,317138316,451323148,304489357,434512782,296171030, DAT08810
 5 317400472,451650840,304882583,434906006,300561301,302654802, DAT08820

6 317236751,319235532,310748235,298197838,0,435168203,302363616, DAT08830
 7 303047691,428647641,309080857,294397144,0,432841615,300295243, DAT08840
 8 310748556,321368985,300721103,302425228,310781325,321369689, DAT08850
 9 321234571,455911065,323321856,428647563,428647257,306624025, DAT08860
 * 317498509,453813387,0,430744715/ DAT08870
 DATA IAL188 /430744473,306656665,306656662,306558358,323335577, DAT08880
 2 323434457,332179086,468493963,0,430745099,321237849,298624587, DAT08890
 3 455910937,296072793,298165067,0,428647563,428647257,306624025, DAT08900
 4 317498509,297940505,306553796,297926656,451683147,455910348, DAT08910
 5 430745177,430744408,317469644,321267275,430286411,0/ DAT08920
 DATA WID110 /18.,21.,21.,21.,19.,18.,21.,22.,8.,16.,21.,17.,24., DAT08930
 2 22.,22.,21.,22.,21.,20.,16.,22.,18.,24.,20.,18.,20.,18.,21.,17., DAT08940
 3 18.,19.,20.,22.,22.,8.,21.,18.,24.,22.,18.,22.,22.,21.,18.,16., DAT08950
 4 18.,20.,20.,22.,20.,19.,19.,18.,19.,18.,12.,19.,19.,8.,10.,17.,8. DAT08960
 5 30.,19.,19.,19.,19.,13.,17.,12.,19.,16.,22.,17.,16.,17.,21.,19., DAT08970
 6 19.,18.,16.,15.,20.,21.,11.,18.,16.,21.,18.,16.,17.,22.,18.,20., DAT08980
 7 20.,20.,22.,18.,23.,23./ DAT08990
 DATA WID111 /20.,22.,21.,22.,21.,20.,23.,24.,11.,15.,22.,18.,25., DAT09000
 2 23.,22.,22.,22.,22.,20.,19.,24.,20.,24.,20.,21.,20.,20.,22.,18., DAT09010
 3 20.,21.,20.,24.,22.,11.,22.,20.,25.,23.,22.,22.,24.,22.,21.,19., DAT09020
 4 19.,21.,20.,23.,22.,20.,21.,19.,21.,19.,13.,19.,22.,11.,11.,21., DAT09030
 5 11.,33.,22.,20.,21.,20.,17.,17.,15.,22.,18.,24.,20.,19.,18.,23., DAT09040
 6 21.,20.,19.,18.,18.,22.,23.,12.,20.,20.,23.,20.,17.,18.,22.,19., DAT09050
 7 21.,20.,20.,22.,18.,23.,23./ DAT09060
 DATA WID112 /20.,24.,21.,23.,23.,22.,22.,26.,13.,18.,23.,20.,27., DAT09070
 2 25.,22.,23.,22.,24.,23.,21.,25.,20.,26.,22.,21.,22.,24.,24.,19., DAT09080
 3 20.,17.,24.,24.,25.,24.,24.,25.,24.,24.,22.,26.,34.,10.,22.,31., DAT09090
 4 19.,14.,14.,27.,22.,21.,19.,18.,21.,18.,15.,20.,21.,13.,13.,20., DAT09100
 5 12.,33.,23.,18.,21.,20.,17.,17.,14.,23.,20.,29.,20.,21.,20.,14., DAT09110
 6 14.,21.,16.,16.,10.,10.,10.,18.,24.,25.,11.,11.,11.,21.,24.,14., DAT09120
 7 14.,8.,20.,14.,26.,22.,16./ DAT09130
 DATA WID113 /20.,20.,20.,20.,20.,20.,20.,20.,20.,26.,26.,22., DAT09140
 2 26.,14.,14.,16.,10.,10.,20.,20.,20.,20.,20.,20.,20.,20.,20.,20., DAT09150
 3 20.,26.,26.,22.,26.,14.,14.,16.,10.,10.,20.,21.,21.,21.,21.,21., DAT09160
 4 21.,21.,21.,21.,21.,26.,26.,22.,26.,15.,15.,17.,11.,11.,21.,20., DAT09170
 5 20.,20.,20.,20.,20.,20.,20.,20.,25.,25.,25.,23.,25.,14.,14.,16., DAT09180
 6 11.,11.,19.,20.,20.,21.,21.,19.,18.,21.,22.,9.,17.,21.,17.,24., DAT09190
 7 22.,22.,20.,22.,20.,20.,17./ DAT09200
 DATA WID114 /22.,20.,26.,20.,19.,20.,20.,20.,18.,20.,18.,14.,20., DAT09210
 2 20.,9.,9.,19.,9.,31.,20.,19.,20.,20.,14.,17.,11.,20.,16.,24.,18., DAT09220
 3 16.,18./ DAT09230
 DATA IST110 /1,5,16,26,34,39,43,54,58,60,66,70,73,78,82,93,100,112 DAT09240
 2 120,131,134,140,143,148,151,154,158,162,173,176,180,185,189,193, DAT09250
 3 205,207,211,214,219,223,227,238,242,249,253,256,265,275,278,287, DAT09260
 4 296,305,314,322,331,340,344,355,360,364,370,374,376,385,390,399, DAT09270
 5 408,417,421,430,434,439,442,447,450,455,459,471,486,494,506,515, DAT09280
 6 526,535,549,554,563,567,577,584,598,607,613,623,632,636,644,655, DAT09290
 7 662,672/ DAT09300
 DATA IST111 /683,690,710,726,740,749,757,775,785,790,799,809,815, DAT09310
 2 826,834,855,868,898,918,935,942,952,958,967,975,983,990,997,1017, DAT09320
 3 1023,1029,1038,1045,1055,1080,1085,1095,1101,1112,1120,1133,1154, DAT09330
 4 1162,1175,1183,1190,1205,1226,1234,1252,1272,1290,1305,1319,1335, DAT09340
 5 1350,1360,1388,1399,1406,1417,1427,1432,1450,1461,1478,1494,1509, DAT09350
 6 1519,1535,1542,1553,1559,1568,1576,1585,1592,1611,1637,1650,1671, DAT09360
 7 1686,1701,1716,1737,1744,1757,1767,1779,1789,1810,1825,1834,1849, DAT09370
 8 1865,1872,1887,1905,1916,1932/ DAT09380
 DATA IST112 /1953,1960,1978,1995,2009,2018,2026,2046,2056,2061, DAT09390
 2 2071,2081,2087,2098,2106,2126,2138,2167,2185,2202,2209,2220,2226, DAT09400
 3 2235,2243,2251,2258,2260,2262,2283,2289,2301,2305,2309,2320,2336, DAT09410
 4 2360,2373,2377,2381,2384,2391,2399,2402,2406,2415,2435,2454,2473, DAT09420
 5 2500,2522,2540,2556,2568,2587,2600,2617,2637,2651,2663,2678,2693, DAT09430
 6 2701,2725,2742,2757,2776,2791,2803,2817,2825,2842,2855,2874,2894, DAT09440
 7 2913,2927,2932,2937,2942,2964,2977,2983,2990,2997,3012,3027,3051, DAT09450

8	3056,3063,3070,3086,3098,3100,3102,3104,3123,3130,3135,3154/	DAT09460
	DATA IST113 /3177,3186,3189,3197,3205,3208,3217,3229,3232,3247,	DAT09470
2	3259,3262,3264,3266,3269,3275,3281,3285,3290,3293,3306,3325,3330,	DAT09480
3	3351,3373,3378,3396,3419,3433,3462,3485,3488,3490,3492,3495,3505,	DAT09490
4	3515,3519,3523,3526,3546,3566,3572,3592,3616,3620,3638,3660,3673,	DAT09500
5	3702,3724,3727,3729,3731,3734,3744,3754,3758,3762,3765,3784,3803,	DAT09510
6	3809,3825,3846,3853,3876,3904,3909,3941,3969,3976,3980,3984,3991,	DAT09520
7	4003,4015,4031,4042,4050,4074,4082,4102,4121,4136,4146,4154,4176,	DAT09530
8	4185,4189,4199,4208,4214,4224,4232,4252,4264,4287,4302,4323/	DAT09540
	DATA IST114 /4329,4341,4347,4357,4364,4371,4379,4396,4413,4429,	DAT09550
2	4446,4464,4474,4497,4508,4519,4530,4539,4543,4562,4573,4591,4608,	DAT09560
3	4625,4634,4656,4663,4674,4680,4690,4697,4704/	DAT09570
END		DAT09580

APPENDIX II. FORTRAN V VERSION FOR UNIVAC 1108/1110

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SUBROUTINE SYMBOL (X,Y,HEIGHT,TEXT,THETA,N)                                SYM00010
                                                                              SYM00020
*****                                                                    SYM00030
                                                                              SYM00040
DIMENSION ISY110(60),ISY111(60),ISY112(8),JSTSYM(22),ISYMB0(128)        SYM00050
DIMENSION IAL110(60),IAL111(60),IAL112(60),IAL113(60),IAL114(60),        SYM00060
2 IAL115(60),IAL116(60),IAL117(60),IAL118(60),IAL119(60),IAL120(60)      SYM00070
3,IAL121(60),IAL122(60),IAL123(60),IAL124(60),IAL125(60),IAL126(60)    SYM00080
4,IAL127(60),IAL128(60)                                                  SYM00090
DIMENSION IAL129(60),IAL130(60),IAL131(60),IAL132(60),IAL133(60),        SYM00100
2 IAL134(60),IAL135(60),IAL136(60),IAL137(60),IAL138(60),IAL139(60)    SYM00110
3,IAL140(60),IAL141(60),IAL142(60),IAL143(60),IAL144(60),IAL145(60)    SYM00120
4,IAL146(60),IAL147(60)                                                  SYM00130
DIMENSION IAL148(60),IAL149(60),IAL150(60),IAL151(60),IAL152(60),        SYM00140
2 IAL153(60),IAL154(60),IAL155(60),IAL156(60),IAL157(60),IAL158(60)    SYM00150
3,IAL159(60),IAL160(60),IAL161(60),IAL162(60),IAL163(60),IAL164(60)    SYM00160
4,IAL165(60),IAL166(60)                                                  SYM00170
DIMENSION IAL167(60),IAL168(60),IAL169(60),IAL170(60),IAL171(60),        SYM00180
2 IAL172(60),IAL173(60),IAL174(60),IAL175(60),IAL176(60),IAL177(60)    SYM00190
3,IAL178(60),IAL179(60),IAL180(60),IAL181(60),IAL182(60),IAL183(60)    SYM00200
4,IAL184(60),IAL185(60)                                                  SYM00210
DIMENSION IAL186(60),IAL187(60),IAL188(31),WID110(100),WID111(100)      SYM00220
2,WID112(100),WID113(100),WID114(32),IST110(100),IST111(100),          SYM00230
3 IST112(100),IST113(100),IST114(32)                                    SYM00240
DIMENSION IFORT(47),IA(256),IB(58),ISPEC(11),OLDX(6),OLDY(6)            SYM00250
DIMENSION IALFBE(4711),WIDTH(432),ISTART(432)                          SYM00260
COMMON /IALPH/ WIDTH,IALFBE,ISTART,ISYMB0,JSTSYM                        SYM00270
COMMON /SAVE/ XL,OLDX,OLDY,IA,IB,NWORD,NCHAR,NCWD,IOUT,FIRST,LNGTHSYM00280
LOGICAL FIRST,LNGTH                                                    SYM00290
EQUIVALENCE (IB(1),IFORT(1)), (IB(48),ISPEC(1))                        SYM00300
EQUIVALENCE (IALFBE(1),IAL110), (IALFBE(61),IAL111), (IALFBE(121),      SYM00310
2 IAL112), (IALFBE(181),IAL113), (IALFBE(241),IAL114), (IALFBE(301)      SYM00320
3,IAL115), (IALFBE(361),IAL116), (IALFBE(421),IAL117), (IALFBE(481)      SYM00330
4,IAL118), (IALFBE(541),IAL119), (IALFBE(601),IAL120), (IALFBE(661)      SYM00340
5,IAL121), (IALFBE(721),IAL122), (IALFBE(781),IAL123), (IALFBE(841)      SYM00350
6,IAL124), (IALFBE(901),IAL125), (IALFBE(961),IAL126),                  SYM00360
7 (IALFBE(1021),IAL127), (IALFBE(1081),IAL128)                          SYM00370
EQUIVALENCE (IALFBE(1141),IAL129), (IALFBE(1201),IAL130),              SYM00380
2 (IALFBE(1261),IAL131), (IALFBE(1321),IAL132), (IALFBE(1381),          SYM00390
3 IAL133), (IALFBE(1441),IAL134), (IALFBE(1501),IAL135),                SYM00400
4 (IALFBE(1561),IAL136), (IALFBE(1621),IAL137), (IALFBE(1681),          SYM00410
5 IAL138), (IALFBE(1741),IAL139), (IALFBE(1801),IAL140),                SYM00420
6 (IALFBE(1861),IAL141), (IALFBE(1921),IAL142), (IALFBE(1981),          SYM00430
7 IAL143), (IALFBE(2041),IAL144), (IALFBE(2101),IAL145),                SYM00440
8 (IALFBE(2161),IAL146), (IALFBE(2221),IAL147)                          SYM00450
EQUIVALENCE (IALFBE(2281),IAL148), (IALFBE(2341),IAL149),              SYM00460
2 (IALFBE(2401),IAL150), (IALFBE(2461),IAL151), (IALFBE(2521),          SYM00470
3 IAL152), (IALFBE(2581),IAL153), (IALFBE(2641),IAL154),                SYM00480
4 (IALFBE(2701),IAL155), (IALFBE(2761),IAL156), (IALFBE(2821),          SYM00490
5 IAL157), (IALFBE(2881),IAL158), (IALFBE(2941),IAL159),                SYM00500
6 (IALFBE(3001),IAL160), (IALFBE(3061),IAL161), (IALFBE(3121),          SYM00510
7 IAL162), (IALFBE(3181),IAL163), (IALFBE(3241),IAL164),                SYM00520
8 (IALFBE(3301),IAL165), (IALFBE(3361),IAL166)                          SYM00530
EQUIVALENCE (IALFBE(3421),IAL167), (IALFBE(3481),IAL168),              SYM00540
2 (IALFBE(3541),IAL169), (IALFBE(3601),IAL170), (IALFBE(3661),          SYM00550
3 IAL171), (IALFBE(3721),IAL172), (IALFBE(3781),IAL173),                SYM00560
4 (IALFBE(3841),IAL174), (IALFBE(3901),IAL175), (IALFBE(3961),          SYM00570
5 IAL176), (IALFBE(4021),IAL177), (IALFBE(4081),IAL178),                SYM00580
6 (IALFBE(4141),IAL179), (IALFBE(4201),IAL180), (IALFBE(4261),          SYM00590
7 IAL181), (IALFBE(4321),IAL182), (IALFBE(4381),IAL183),                SYM00600

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8 (IALFBE(4441),IAL184), (IALFBE(4501),IAL185) SYM00610
EQUIVALENCE (IALFBE(4561),IAL186), (IALFBE(4621),IAL187), SYM00620
2 (IALFBE(4681),IAL188) SYM00630
EQUIVALENCE (WIDTH(1),WID110), (WIDTH(101),WID111), (WIDTH(201), SYM00640
2 WID112), (WIDTH(301),WID113), (WIDTH(401),WID114) SYM00650
EQUIVALENCE (ISTART(1),IST110), (ISTART(101),IST111), (ISTART(201) SYM00660
2,IST112), (ISTART(301),IST113), (ISTART(401),IST114) SYM00670
EQUIVALENCE (ISYMB0(1),ISY110), (ISYMB0(61),ISY111), (ISYMB0(121), SYM00680
2 ISY112) SYM00690
DATA IA /256*511/ SYM00700
DATA IFORT /1HA,1HB,1HC,1HD,1HE,1HF,1HG,1HH,1HI,1HJ,1HK,1HL,1HM, SYM00710
2 1HN,1HO,1HP,1HQ,1HR,1HS,1HT,1HU,1HV,1HW,1HX,1HY,1HZ,1H ,1HO,1H1, SYM00720
3 1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9,1H+,1H-,1H/,1H=,1H(,1H),1H*,1H,, SYM00730
4 1H.,1H$/ SYM00740
***** SYM00750
***** SYM00760
***** SYM00770
THE IMPLEMENTOR MUST SUPPLY THE FOLLOWING TWO CARDS TO SUIT THE SYM00780
INSTALLATION. NWORD=BITS/WORD,NCHAR=BITS/CHARACTER SYM00790
DATA ISPEC /1H\,1H",1H@,1H#,1H&,1H^,1H%,1H?,1H!,1H;,1H:/ SYM00800
DATA NWORD /36/ ,NCHAR /6/ ,IOUT /6/ SYM00810
***** SYM00820
***** SYM00830
***** SYM00840
DATA FIRST /.TRUE./ ,LNGTH /.FALSE./ SYM00850
DATA ISY110 /471149226,357246358,315959338,336592896,470820906, SYM00860
2 345320100,357443862,327886236,315762474,336920576,470820906, SYM00870
3 355313115,336920576,470493226,449850016,0,455911911,456370649,0, SYM00880
4 471149216,336274848,336930848,0,470493226,357574048,336920576, SYM00890
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5	329787344,338241685,340502618,336471966,328181344,315630815,	SYM05190
6	305079260,298656599,296362897,300393549,308684171,321234700,	SYM05200
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8	308654932,298394766,308651209,306390020,300032901,295936842,	SYM05220
9	298263570,306881880,317498969,327952214,329852686,323364363,	SYM05230
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7	321562198,319563161,309109784,298492754,296199053,300295243,	SYM05310
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3	296297295,298230732,304456907,314975758,443327576,300589970,	SYM05370
4	298263500,0,456107550,321824414,323987040,317728095,311370972,	SYM05380
5	307012555,298033989,451945822,311305432,304587787,300163974,	SYM05390
6	295871172,287449605,285418055,289612357,432842265,0,460105163,	SYM05400
7	314844421,304227204,293774022,291742472,295936774,458007947,	SYM05410
8	312747205,304231954,319464920,313304281,302785429,296297295,	SYM05420
9	298230732,304456907,312878543,319370457,304882645,298394510,	SYM05430
*	300285952,441459467,443556683,434709590,309077337/	SYM05440
	DATA IAL154 /317498968,323724949,319268364,321238489,321627733,	SYM05450
2	317171148,319137483,329688975,435168480,0,443557023,309273887,	SYM05460
3	309342933,294364057,304915608,306881551,302392395,437036120,	SYM05470
4	304784335,300295179,308651341,315064320,445654239,311371103,	SYM05480
5	311440149,296461273,307012824,308978699,300163974,295871172,	SYM05490
6	287449605,285418055,289612357,439133336,306881483,298066758,	SYM05500
7	291635200,441459467,443556683,457975383,323692247,325854873,	SYM05510
8	321693144,308946003,300528723,308880716,314946643,306783500,	SYM05520
9	312845771,321267407,435168480,0,441459602,296166220,298165323,	SYM05530
*	308716815,443556818,298263436,300266464,309329920/	SYM05540
	DATA IAL155 /426418967,298624089,306979990,304686027,437036120,	SYM05550
2	304817170,298169426,309011800,317498969,325854999,327853643,	SYM05560
3	455911127,325756427,459876182,334243929,342665560,348891541,	SYM05570
4	344434956,346405081,346794325,342337740,344304075,354855567,0,	SYM05580
5	426418967,298624089,306979990,304686027,437036120,304817170,	SYM05590
6	298169426,309011800,317498969,325854999,327853711,323364555,	SYM05600
7	455911127,325756495,321267339,329623501,336035840,443327512,	SYM05610
8	298492754,296199053,300295243,308651404,319268434,321562135,	SYM05620
9	317465945,309114073,304882645,298394510,300299467,312878543,	SYM05630
*	319366678,317456384,426418967,298624089,306979990,304685892/	SYM05640

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2 323757783,327853842,325559884,314942731,306586703,304690840,	SYM05660
3 325789394,323462668,314946116,302120960,458007812,460105028,	SYM05670
4 453584405,317465945,309109784,298492754,296199053,300295243,	SYM05680
5 308651340,317171218,443327576,300589970,298263500,438445572,0,	SYM05690
6 426418967,298624089,306979990,304686027,437036120,304817170,	SYM05700
7 298169426,309011800,317498969,323757719,321594903,321650688,	SYM05710
8 453748246,321594967,319563097,307012568,298558357,300557712,	SYM05720
9 317174678,300590481,317203917,314975435,302359372,294036238,	SYM05730
* 296166221,0,443556818,298263436,300262539,310814031/	SYM05740
DATA IAL157 /445654034,300360652,302363481,315392000,426418967,	SYM05750
2 298624089,306979989,302490637,306557977,304882773,300393421,	SYM05760
3 302392459,310748556,319235730,462202514,321332812,323331915,	SYM05770
4 333883407,464299730,323430028,325419008,426418967,298624089,	SYM05780
5 306979989,302490637,306557977,304882773,300393421,302392459,	SYM05790
6 308651404,319235729,325756633,323790551,0,426418967,298624089,	SYM05800
7 306979989,302490637,306557977,304882773,300393421,302392459,	SYM05810
8 310748556,319235664,460105296,321300108,327526283,335947918,	SYM05820
9 342370580,344762585,344700697,323495565,327516160,430613464,	SYM05830
* 304915737,313238868,443327767,311043280,306652172,298165067/	SYM05840
DATA IAL158 /294003469,296166285,296105168,308716811,317040204,	SYM05850
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3 310814027,0,426418967,298624089,306979989,302490637,306557977,	SYM05870
4 304882773,300393421,302392459,310748556,319235730,464299595,	SYM05880
5 319038853,308421636,297968454,295936904,300131206,462202379,	SYM05890
6 316941637,308412416,460105367,319464463,298230603,432710615,	SYM05900
7 304915737,319534039,304882968,319530647,432448525,310781388,	SYM05910
8 321303565,310748619,321300111,0,433202052,435299268,433202532,	SYM05920
9 432153924,0,443688132,445785348,431105316,430056708,0,447751044,	SYM05930
* 460334340,432711445,430417615/	SYM05940
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3 298525524,296297360,302458187,432547021,312845705,314811717,	SYM05970
4 308421700,300065671,298066889,302261191,0,441459806,307111134,	SYM05980
5 307246240,306328725,304686212,308880533,428647320,302818202,	SYM05990
6 294433561,319599897,315368985,315434265,0,434938776,300655640,	SYM06000
7 300725197,298197963,302392269,0,434938776,300655640,300725195,	SYM06010
8 298197965,302392330,300163975,0,435168158,300491806,300954590,	SYM06020
9 300692429,298197963,302392269,0,432939995,298656603,296625054,	SYM06030
* 300917856/	SYM06040
DATA IAL160 /311436767,319759964,321725976,317433045,308884768,	SYM06050
2 315598302,319694362,317465942,442934412,308651276,308707328,	SYM06060
3 468722507,441459998,311305434,304915417,296592221,298820640,	SYM06070
4 307242271,317662878,330278880,459875921,319268365,323331851,	SYM06080
5 331753422,333981522,325648384,468461463,334178327,336340953,	SYM06090
6 332179288,327886481,319235468,310748235,298197838,296264595,	SYM06100
7 311141785,317564381,315598112,307209309,304981144,311076430,	SYM06110
8 325461899,333817868,335983691,300295054,298361811,304788571,	SYM06120
9 307013262,327559051,0,437035992,302752856,302822221,294003531,	SYM06130
* 298188800,437035992,302752856,302822219,294003533,298197899/	SYM06140
DATA IAL161 /296002247,0,441459807,300528799,300528800,309306323,	SYM06150
2 430351116,296067980,296124416,439231643,304948251,302916702,	SYM06160
3 307209568,321922847,330213211,327984856,313205973,308913426,	SYM06170
4 315176544,326084381,328050393,323757591,440837196,306554060,	SYM06180
5 306610176,430482259,298525719,306947350,319399570,327755667,	SYM06190
6 334148435,298492950,306914581,319366801,327722898,334145495,0,	SYM06200
7 445784916,310509568,433202516,297926656,433202052,0,430875547,	SYM06210
8 323462861,325432218,323433309,296592281,323397323,441131922,	SYM06220
9 296231758,298197835,430449612,432612240,300360652,296072531,	SYM06230
* 323761693,319628888,325854938,321758749/	SYM06240
DATA IAL162 /453944922,325844992,437265311,296657755,298624024,	SYM06250
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3 334112399,432678868,0,454042756,456139844,445424664,298525523,	SYM06270

4 296231822,302392523,314943116,327624529,329918230,323757529, SYM06280
 5 311211289,304882646,298427280,300360780,308655499,321267406, SYM06290
 6 327722772,325789272,317489152,441459806,307111134,307246240, SYM06300
 7 306787478,304751824,306652240,308946070,441001092,440673350, SYM06310
 8 306324678,306459417,298591257,298656537,428647961,445425048, SYM06320
 9 319595930,311210763,298132491,298197771,428189195,444966282, SYM06330
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 3 323888794,321660373,296068811,0,435168928,311174616,321627798, SYM06370
 4 325691089,323429900,312845451,300295053,296189952,451945298, SYM06380
 5 327759328,317030400,456139744,298558424,307012953,319563414, SYM06390
 6 325691089,323429900,312845451,300295053,296189952,458139231, SYM06400
 7 315630880,305112028,298558354,300360780,310748491,319170190, SYM06410
 8 325625554,323659287,313271576,304849877,298385408,460334155, SYM06420
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 * 325559949,321267083,306553804,298230607/ SYM06440
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 3 303015136,311436767,321824409,323626575,317072651,306553804, SYM06470
 4 298254336,451847627,432678932,0,432678932,0,466756356,0,432777239 SYM06480
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 7 430679505,451650385,0,436609995,298197965,302392330,300163975,0, SYM06510
 8 434545548,300262412,300318720,441590919,449979783,460236383, SYM06520
 9 315630752,300917597,296592281,300688471,317367892/ SYM06530
 DATA IAL165 /323593937,325527116,314942603,300294990,0,443556895, SYM06540
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 3 319792480,309343456,305112094,300819351,298460111,302425164, SYM06560
 4 308655435,317072909,321365652,323724892,319759839,313524224, SYM06570
 5 437134493,313533771,445621515,436577867,0,432939995,298656603, SYM06580
 6 296625054,300917920,315631199,323954396,325920408,317400212, SYM06590
 7 302621585,296166219,449848863,321857180,323823192,315303060, SYM06600
 8 430351246,302458188,319170189,325530638,312845899,323364558, SYM06610
 9 325582848,432939995,298656603,296625054,300917920,315631199, SYM06620
 * 323921562,321660311,309048736,319792733,321725976/ SYM06630
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 3 314933248,449783179,451945931,451945233,327726283,323321856, SYM06660
 4 435168086,430646232,307012953,319563414,325691089,323429900, SYM06670
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 6 323593873,321332684,312849376,321926111,311404128,0,456042012, SYM06690
 7 321758876,323921503,317728032,305112029,298689367,296264590, SYM06700
 8 302392523,312845836,323430097,325658261,319530328,311174231, SYM06710
 9 300589970,445654175,302949339,298558353,300360780,308655435, SYM06720
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 3 441459679,298754970,300688535,315336280,323823261,321889696, SYM06760
 4 307246240,303014877,300753944,306951575,319563354,321824287, SYM06770
 5 315634839,300622741,296330063,298230732,306554251,321267341, SYM06780
 6 325560019,323659350,315339927,302719957,298427279,300327948, SYM06790
 7 306558347,319170125,323462803,321562134,315326464,458008150, SYM06800
 8 317334803,308913172,298525529,296559517,303015136,313533983, SYM06810
 9 323921626,325723792,321332684,310748235,300295054,298296272, SYM06820
 * 302490574,443130964,300622745,298656733,305112288,447751647/ SYM06830
 DATA IAL168 /321824410,323626576,319235468,310738944,451847627, SYM06840
 2 432678932,0,432678932,0,466756356,0,432777239,432580625,0, SYM06850
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 4 302883798,300491789,304424134,0,431104994,305112283,311108882, SYM06870
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8 458139228,323856092,326018655,315630752,300917597,296592281, SYM06910
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 * 325527116/ SYM06930
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 3 325723928,328050398,323986976,315635104,311403677,302851031, SYM06960
 4 298427280,300328011,442869068,317138513,323626712,325953182, SYM06970
 5 319815680,449717323,454042763,454042973,307078170,451847387, SYM06980
 6 302841856,439231643,304948251,302916702,307209568,319825631, SYM06990
 7 328115995,325887575,315270291,300458831,291878432,323987165, SYM07000
 8 325953177,319530131,428254030,300360972,317072973,323466190, SYM07010
 9 310748619,321267343,0,439231643,304948251,302916702,307209568, SYM07020
 * 319825631,328115995,325887511,313210400,323987165/ SYM07030
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 2 319169867,304456588,296133391,294134609,298328911,447423957, SYM07050
 3 319432274,321365517,317072715,0,458204427,460334411,460333841, SYM07060
 4 327712768,443556758,443557728,443524639,330314646,300655768, SYM07070
 5 313271831,321595028,323528270,317072651,304456588,296133391, SYM07080
 6 294134609,298328911,447489495,319497812,321431054,314975499,0, SYM07090
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 8 296330063,298230732,304456971,317072974,323495571,321562134, SYM07110
 9 315335895,304817108,298399136,311403677,302851031,298427278, SYM07120
 * 300299531,314975758,321398356,319488000,437265306/ SYM07130
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 3 330301440,447751327,305079324,302818391,309011862,323725016, SYM07160
 4 328017693,326084128,313537888,309306526,305013849,306947286, SYM07170
 5 449521239,323757786,326018719,319829206,300589907,294167310, SYM07180
 6 296100875,310748684,321300111,323561044,319464854,443229205, SYM07190
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 1 326018776/ SYM07240
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 5 443688225,313402711,310977743,304456583,0,445654292,435070551, SYM07290
 6 456041431,0,430285580,296133516,298165065,291733504,430351116, SYM07300
 7 296067980,296124416,449979271,460465351,462300891,328017755, SYM07310
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 9 435004505,319465044,323561103,321299980,312845387,298197837/ SYM07330
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 3 309343327,300819351,298460111,304493581,308684108,319206860, SYM07360
 4 321365652,323724892,317699614,313500895,302972928,437134493, SYM07370
 5 313533771,437134363,307111198,310748491,0,432907164,300885023, SYM07380
 6 307242400,319792734,323888794,321660373,298169243,300786652, SYM07390
 7 302982303,315598366,321791578,319563157,296072076,325461707, SYM07400
 8 430286539,0,435168928,309048288,300918367,456139927,443295064, SYM07410
 9 319530645,325658321,323429900,312845451,300295053,296199055, SYM07420
 * 441165143,319497875,449554005,323561105,321332620/ SYM07430
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 3 435168151,437232600,435168864,321893407,321893336,307012953, SYM07460
 4 319563414,325691089,323429900,312845451,300295053,296199055, SYM07470
 5 432776151,304883032,319530644,449586774,323593873,321332620, SYM07480
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 7 315630880,305112028,298558354,300360780,310748491,319170190, SYM07500
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 9 441426972,300655570,302458060,434644045,310781260,319202960, SYM07520
 * 449193550,323528338,321562007,457811478,313238807/ SYM07530

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3 306947478,319465044,323561103,321299852,306586573,298296210,	SYM07560
4 300557333,306914711,319563353,323856029,321889696,307246111,	SYM07570
5 300852187,302818456,315336214,323626706,325559949,321267083,	SYM07580
6 306553804,298230607,296297364,302720151,315368985,321758813,	SYM07590
7 319796830,315597983,300888974,304494028,323420160,455812564,	SYM07600
8 311010515,302654358,296526682,298755103,309339424,317695581,	SYM07610
9 323790484,321365452,310748299,300295054,300360716,455910934,	SYM07620
* 313144920,317367572,308945941,298595476,300622745,298656733,	SYM07630
1 307213211/	SYM07640
DATA IAL176 /302982367,311403998,321762655,319727193,321529359,	SYM07650
2 314979789,310781068,300318720,449750412,317076893,317629900,	SYM07660
3 432711637,334115733,298461140,0,432711637,334115733,298461140,0,	SYM07670
4 466756356,295843748,334635844,0,432842713,334246809,298592216,	SYM07680
5 432580561,333984657,298330064,0,445785250,303014811,296428370,	SYM07690
6 298230793,306390276,312620324,313664738,305112027,298525586,	SYM07700
7 300328009,308487492,0,431104994,305112283,311108882,308716617,	SYM07710
8 300098372,297939812,298984482,307209499,313206098,310813833,	SYM07720
9 302195588,0,441459807,308978836,441459860,441459935,304784532,	SYM07730
* 430875549/	SYM07740
DATA IAL177 /315336151,430876119,430875484,317466071,451847581,	SYM07750
2 298558295,451846999,451847644,296493911,0,438707211,300262284,	SYM07760
3 298230734,302457933,304423944,298038221,300295180,302425037,	SYM07770
4 436577354,438707208,0,434578317,298197963,302359628,304522254,	SYM07780
5 300364749,300295180,302425037,0,443688135,310621412,311567623,	SYM07790
6 453944989,319792480,307241951,296657755,298623960,317335059,	SYM07800
7 321431119,319202636,306586637,300365341,317662559,307209182,	SYM07810
8 298754971,300721621,321496721,323462733,319169867,306553804,	SYM07820
9 296166350,455550348,0,445653771,445555531,293975325,325429003,	SYM07830
* 445654795,434677329,432547472/	SYM07840
DATA IAL178 /0,433070987,435135436,433071520,321889950,325986009,	SYM07850
2 323724886,315274207,315598430,323888793,321627542,434840982,	SYM07860
3 321562260,325658319,323397196,314942347,434808213,321529490,	SYM07870
4 323462733,314975180,0,462268125,321889760,309339231,300852123,	SYM07880
5 296493907,298329038,304489675,317040204,325527312,462268123,	SYM07890
6 323921502,317695199,305079259,298591123,300426317,308684236,	SYM07900
7 321300110,325592848,0,433070987,435135436,433071456,319792797,	SYM07910
8 325953304,327788240,323429900,312845195,435135839,319759965,	SYM07920
9 323856088,325691024,321332749,312878028,0,433070987,435135436,	SYM07930
* 433071776,435136159,324023254/	SYM07940
DATA IAL179 /313206101,434808149,434513548,323335051,323321856,	SYM07950
2 433070987,435135435,298169248,324023263,323987104,434840918,	SYM07960
3 313177045,313163776,462268125,321889760,309339231,300852123,	SYM07970
4 296493907,298329038,304489675,317040204,325527312,327820756,	SYM07980
5 462268123,323921502,317695199,305079325,300786584,298427344,	SYM07990
6 302457933,308684236,321300110,325592787,317302228,0,433070987,	SYM08000
7 433071072,300262283,462431968,325429003,462432011,434841302,	SYM08010
8 434808533,0,433070987,300266400,300950475,0,449848720,312911052,	SYM08020
9 304489421,298328912,449848800,317203853,312878283,304456652,	SYM08030
* 298230608,0,433070987,300266400/	SYM08040
DATA IAL180 /300950475,462431968,300562208,300528791,325429003,	SYM08050
2 443262731,0,433070987,433071072,300299212,323364491,432383627,0,	SYM08060
3 433070987,435004363,298169307,314946464,315045792,315045723,	SYM08070
4 314947419,329623435,466626443,0,433070987,435069899,298169309,	SYM08080
5 327529376,325531360,325531360,328214283,0,443556959,300852123,	SYM08090
6 296493907,298329038,304489675,317040204,325527312,329885528,	SYM08100
7 328050397,321889760,309343519,305079259,298591123,300426317,	SYM08110
8 310781324,321300176,327788312,325953118,315598111,0,433070987,	SYM08120
9 435135435,298169248,317728351,323954396,325887639,321594837,	SYM08130
* 300594143,317695582/	SYM08140
DATA IAL181 /323888793,321627606,300613632,443556959,300852123,	SYM08150
2 296493907,298329038,304489675,317040204,325527312,329885528,	SYM08160

3 328050397,321889760,309343519,305079259,298591123,300426317, SYM08170
4 310781324,321300176,327788312,325953118,315598111,449259209, SYM08180
5 327464334,317138697,0,433070987,435135435,298169248,315631199, SYM08190
6 323954396,325887639,321594773,300594143,315598430,323888793, SYM08200
7 321627542,300627221,323331787,447391435,0,460236383,315630752, SYM08210
8 300917597,296592281,300688471,315270676,321496721,323429965, SYM08220
9 314975372,302425038,296171229,321824286,315597983,300884893, SYM08230
* 298689497,304883094,319465107,325625550,321267083/ SYM08240
DATA IAL182 /306553804,296157184,441427083,443524299,306557728, SYM08250
2 321922655,428876575,321880064,433070993,300360780,310748555, SYM08260
3 321267406,327722784,433071072,300459022,304522508,314975821, SYM08270
4 323430097,326117152,0,428877067,428876640,310851360,326116622, SYM08280
5 462431499,0,428876939,428876640,306656736,306656733,306558429, SYM08290
6 327529952,327628960,338700046,475014923,0,430974603,325432160, SYM08300
7 298854091,460334752,296072928,298165067,0,428877014,308651275, SYM08310
8 428876640,311113440,324019414,460334358,310738944,458236747, SYM08320
9 460333963,430974688,430973791,323990412,325461707,430286539,0, SYM08330
* 455910987,323335769/ SYM08340
DATA IAL183 /323790475,455812568,313304217,302785430,296330065, SYM08350
2 298263564,306554187,317072974,455812440,306979863,300622739, SYM08360
3 298361806,302425228,312878670,0,433070987,300266400,300950475, SYM08370
4 434840664,309110169,319563414,325691089,323429900,314942667, SYM08380
5 304489422,434840792,315368983,321595027,323528270,319202700, SYM08390
6 308683726,0,455812568,313304217,302785430,296330065,298263564, SYM08400
7 306554187,317072974,455812629,317433176,306979863,300622739, SYM08410
8 298361806,302425228,312878541,319268430,0,456140363,323335776, SYM08420
9 324019851,455812568,313304217,302785430,296330065,298263564, SYM08430
* 306554187,317072974,455812440,306979863/ SYM08440
DATA IAL184 /300622739,298361806,302425228,312878670,0,432612946, SYM08450
2 321562135,317465945,307012632,298525523,296264590,302392459, SYM08460
3 312845772,321336211,319399445,317433176,306979863,300622739, SYM08470
4 298361806,302425228,312878541,319268430,0,447751392,305112092, SYM08480
5 302359627,447751519,309306462,441427036,304460633,311207192, SYM08490
6 430744408,311164928,458008153,321201671,316876101,308454470, SYM08500
7 302228359,458008202,321103301,312616068,302162823,455812568, SYM08510
8 313304217,302785430,296330065,298263564,306554187,317072974, SYM08520
9 455812440,306979863,300622739,298361806,302425228,312878670,0, SYM08530
* 433070987,300266400,300950475,434807960/ SYM08540
DATA IAL185 /311207385,321660565,323335125,306947352,315368983, SYM08550
2 321562187,323321856,433070943,296690589,300852254,303014880, SYM08560
3 298857375,298787806,300917663,432841611,300266393,300721099,0, SYM08570
4 433070943,296690589,300852254,303014880,298857375,298787806, SYM08580
5 300917663,432841604,300037017,300721092,0,433070987,300266400, SYM08590
6 300950475,458008153,300398233,300364946,319137419,443131531,0, SYM08600
7 433070987,300266400,300950475,0,432841611,300266393,300721099, SYM08610
8 434807960,311207385,321660565,323335125,306947352,315368983, SYM08620
9 321562187,323335829,330049497,340568344,346728779,457877335, SYM08630
* 334243928,342599957,344303947/ SYM08640
DATA IAL186 /0,432841611,300266393,300721099,434807960,311207385, SYM08650
2 321660565,323335125,306947352,315368983,321562187,323321856, SYM08660
3 441230360,298525523,296264590,302392459,312845772,321332881, SYM08670
4 323593814,317465945,307016856,302752726,298427281,300360717, SYM08680
5 306586956,317105678,321431123,319497687,313271448,0,432841604, SYM08690
6 300037017,300721092,434840664,309110169,319563414,325691089, SYM08700
7 323429900,314942667,304489422,434840792,315368983,321595027, SYM08710
8 323528270,319202700,308683726,0,455910980,323106393,323790468, SYM08720
9 455812568,313304217,302785430,296330065,298263564,306554187, SYM08730
* 317072974,455812440,306979863,300622739/ SYM08740
DATA IAL187 /298361806,302425228,312878670,0,432841611,300266393, SYM08750
2 300721099,434742294,306980121,317502419,302687383,311174616, SYM08760
3 317489152,453715416,311207001,298591062,298460179,313042384, SYM08770
4 449357263,317138316,451323148,304489357,434512782,296171030, SYM08780
5 317400472,451650840,304882583,434906006,300561301,302654802, SYM08790

6 317236751,319235532,310748235,298197838,0,435168203,302363616, SYM08800
7 303047691,428647641,309080857,294397144,0,432841615,300295243, SYM08810
8 310748556,321368985,300721103,302425228,310781325,321369689, SYM08820
9 321234571,455911065,323321856,428647563,428647257,306624025, SYM08830
* 317498509,453813387,0,430744715/ SYM08840
DATA IAL188 /430744473,306656665,306656662,306558358,323335577, SYM08850
2 323434457,332179086,468493963,0,430745099,321237849,298624587, SYM08860
3 455910937,296072793,298165067,0,428647563,428647257,306624025, SYM08870
4 317498509,297940505,306553796,297926656,451683147,455910348, SYM08880
5 430745177,430744408,317469644,321267275,430286411,0/ SYM08890
DATA WID110 /18.,21.,21.,21.,19.,18.,21.,22.,8.,16.,21.,17.,24., SYM08900
2 22.,22.,21.,22.,21.,20.,16.,22.,18.,24.,20.,18.,20.,18.,21.,17., SYM08910
3 18.,19.,20.,22.,22.,8.,21.,18.,24.,22.,18.,22.,22.,21.,18.,16., SYM08920
4 18.,20.,20.,22.,20.,19.,19.,18.,19.,18.,12.,19.,19.,8.,10.,17.,8. SYM08930
5 30.,19.,19.,19.,19.,13.,17.,12.,19.,16.,22.,17.,16.,17.,21.,19., SYM08940
6 19.,18.,16.,15.,20.,21.,11.,18.,16.,21.,18.,16.,17.,22.,18.,20., SYM08950
7 20.,20.,22.,18.,23.,23./ SYM08960
DATA WID111 /20.,22.,21.,22.,21.,20.,23.,24.,11.,15.,22.,18.,25., SYM08970
2 23.,22.,22.,22.,22.,20.,19.,24.,20.,24.,20.,21.,20.,20.,22.,18., SYM08980
3 20.,21.,20.,24.,22.,11.,22.,20.,25.,23.,22.,22.,24.,22.,21.,19., SYM08990
4 19.,21.,20.,23.,22.,20.,21.,19.,21.,19.,13.,19.,22.,11.,11.,21., SYM09000
5 11.,33.,22.,20.,21.,20.,17.,17.,15.,22.,18.,24.,20.,19.,18.,23., SYM09010
6 21.,20.,19.,18.,18.,22.,23.,12.,20.,20.,23.,20.,17.,18.,22.,19., SYM09020
7 21.,20.,20.,22.,18.,23.,23./ SYM09030
DATA WID112 /20.,24.,21.,23.,23.,22.,22.,26.,13.,18.,23.,20.,27., SYM09040
2 25.,22.,23.,22.,24.,23.,21.,25.,20.,26.,22.,21.,22.,24.,24.,19., SYM09050
3 20.,17.,24.,24.,25.,24.,24.,25.,24.,24.,22.,26.,34.,10.,22.,31., SYM09060
4 19.,14.,14.,27.,22.,21.,19.,18.,21.,18.,15.,20.,21.,13.,13.,20., SYM09070
5 12.,33.,23.,18.,21.,20.,17.,17.,14.,23.,20.,29.,20.,21.,20.,14., SYM09080
6 14.,21.,16.,16.,10.,10.,10.,18.,24.,25.,11.,11.,11.,21.,24.,14., SYM09090
7 14.,8.,20.,14.,26.,22.,16./ SYM09100
DATA WID113 /20.,20.,20.,20.,20.,20.,20.,20.,20.,20.,26.,26.,22., SYM09110
2 26.,14.,14.,16.,10.,10.,20.,20.,20.,20.,20.,20.,20.,20.,20.,20., SYM09120
3 20.,26.,26.,22.,26.,14.,14.,16.,10.,10.,20.,21.,21.,21.,21.,21., SYM09130
4 21.,21.,21.,21.,21.,26.,26.,22.,26.,15.,15.,17.,11.,11.,21.,20., SYM09140
5 20.,20.,20.,20.,20.,20.,20.,20.,20.,20.,25.,25.,23.,25.,14.,16., SYM09150
6 11.,11.,19.,20.,20.,21.,21.,19.,18.,21.,22.,9.,17.,21.,17.,24., SYM09160
7 22.,22.,20.,22.,20.,20.,17./ SYM09170
DATA WID114 /22.,20.,26.,20.,19.,20.,20.,20.,18.,20.,18.,14.,20., SYM09180
2 20.,9.,9.,19.,9.,31.,20.,19.,20.,20.,14.,17.,11.,20.,16.,24.,18., SYM09190
3 16.,18./ SYM09200
DATA IST110 /1,5,16,26,34,39,43,54,58,60,66,70,73,78,82,93,100,112 SYM09210
2 120,131,134,140,143,148,151,154,158,162,173,176,180,185,189,193, SYM09220
3 205,207,211,214,219,223,227,238,242,249,253,256,265,275,278,287, SYM09230
4 296,305,314,322,331,340,344,355,360,364,370,374,376,385,390,399, SYM09240
5 408,417,421,430,434,439,442,447,450,455,459,471,486,494,506,515, SYM09250
6 526,535,549,554,563,567,577,584,598,607,613,623,632,636,644,655, SYM09260
7 662,672/ SYM09270
DATA IST111 /683,690,710,726,740,749,757,775,785,790,799,809,815, SYM09280
2 826,834,855,868,898,918,935,942,952,958,967,975,983,990,997,1017, SYM09290
3 1023,1029,1038,1045,1055,1080,1085,1095,1101,1112,1120,1133,1154, SYM09300
4 1162,1175,1183,1190,1205,1226,1234,1252,1272,1290,1305,1319,1335, SYM09310
5 1350,1360,1388,1399,1406,1417,1427,1432,1450,1461,1478,1494,1509, SYM09320
6 1519,1535,1542,1553,1559,1568,1576,1585,1592,1611,1637,1650,1671, SYM09330
7 1686,1701,1716,1737,1744,1757,1767,1779,1789,1810,1825,1834,1849, SYM09340
8 1865,1872,1887,1905,1916,1932/ SYM09350
DATA IST112 /1953,1960,1978,1995,2009,2018,2026,2046,2056,2061, SYM09360
2 2071,2081,2087,2098,2106,2126,2138,2167,2185,2202,2209,2220,2226, SYM09370
3 2235,2243,2251,2258,2260,2262,2283,2289,2301,2305,2309,2320,2336, SYM09380
4 2360,2373,2377,2381,2384,2391,2399,2402,2406,2415,2435,2454,2473, SYM09390
5 2500,2522,2540,2556,2568,2587,2600,2617,2637,2651,2663,2678,2693, SYM09400
6 2701,2725,2742,2757,2776,2791,2803,2817,2825,2842,2855,2874,2894, SYM09410
7 2913,2927,2932,2937,2942,2964,2977,2983,2990,2997,3012,3027,3051, SYM09420

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8 3056,3063,3070,3086,3098,3100,3102,3104,3123,3130,3135,3154/ SYM09430
DATA IST113 /3177,3186,3189,3197,3205,3208,3217,3229,3232,3247, SYM09440
2 3259,3262,3264,3266,3269,3275,3281,3285,3290,3293,3306,3325,3330, SYM09450
3 3351,3373,3378,3396,3419,3433,3462,3485,3488,3490,3492,3495,3505, SYM09460
4 3515,3519,3523,3526,3546,3566,3572,3592,3616,3620,3638,3660,3673, SYM09470
5 3702,3724,3727,3729,3731,3734,3744,3754,3758,3762,3765,3784,3803, SYM09480
6 3809,3825,3846,3853,3876,3904,3909,3941,3969,3976,3980,3984,3991, SYM09490
7 4003,4015,4031,4042,4050,4074,4082,4102,4121,4136,4146,4154,4176, SYM09500
8 4185,4189,4199,4208,4214,4224,4232,4252,4264,4287,4302,4323/ SYM09510
DATA IST114 /4329,4341,4347,4357,4364,4371,4379,4396,4413,4429, SYM09520
2 4446,4464,4474,4497,4508,4519,4530,4539,4543,4562,4573,4591,4608, SYM09530
3 4625,4634,4656,4663,4674,4680,4697,4704/ SYM09540
C SYM09550
C ***** SYM09560
C SYM09570
C FORTRAN V UNIVAC 1108 VERSION 3.0 AUGUST 1977 SYM09580
C PROBLEMS ETCETERA CONTACT N.WOLCOTT,NBS,301-921-3384 SYM09590
C SYM09600
C ***** SYM09610
C SYM09620
C SIMILAR TO ROUTINE SYMBOL USED IN PEN PLOTTERS SYM09630
C INSTRUCTIONS FOR DRAWING CHARACTERS ARE IN ALFBET STORED SYM09640
C TWO INSTRUCTIONS PER WORD. A ZERO FOR PEN POSITION INDICATES SYM09650
C END OF A CHARACTER. INPUT TEXTUAL STRINGS MUST BE COMPOSED OF ONLY SYM09660
C THE FORTRAN CHARACTERS A-Z 0-9+ -=()* ,. $ AND THE NON-FORTRAN SYM09670
C SPECIAL CHARACTERS WHICH ARE DESCRIBED BELOW. SYM09680
C X,Y = (X,Y) COORDINATE OF LOWER LEFT HAND CORNER OF TEXT SYM09690
C HEIGHT = HEIGHT (IN INCHES) OF UPPER CASE CHARACTERS SYM09700
C TEXT = INPUT TEXTUAL ARRAY OR HOLLERITH STRING SYM09710
C THETA = ANGLE IN DEGREES OF TEXT FROM X-AXIS SYM09720
C N = NUMBER OF CHARACTERS IN TEXT STRING SYM09730
C SYM09740
C IF N IS NEGATIVE AND TEXT IS A BINARY INTEGER BETWEEN SYM09750
C 1 AND 21 A CENTERED SYMBOL FROM THE SYMBOL SET IS PRODUCED SYM09760
C AT (X,Y). SYM09770
C IF N IS 0 A SINGLE SIMPLEX ALPHANUMERIC FORTRAN CHARACTER SYM09780
C (RIGHT JUSTIFIED IN TEXT) IS PRODUCED AT (X,Y). SYM09790
C IF X AND/OR Y EQUAL 999. THE ANNOTATION WILL BE CONTINUED SYM09800
C AFTER THE PREVIOUS X AND/OR Y TERMINATION. SYM09810
C SYM09820
C ISTART(I) CONTAINS THE INDEX INTO ALFBET OF THE FIRST INSTRUCTION SYM09830
C OF CHARACTER NUMBER I WHOSE WIDTH IS STORED IN WIDTH(I) SYM09840
C CHARACTERS 1 TO 26 ARE ROMAN SIMPLEX UPPER CASE SYM09850
C CHARACTERS 27 TO 50 ARE GREEK SIMPLEX UPPER CASE SYM09860
C CHARACTERS 51 TO 76 ARE ROMAN SIMPLEX LOWER CASE SYM09870
C CHARACTERS 77 TO 100 ARE GREEK SIMPLEX LOWER CASE SYM09880
C CHARACTERS 101 TO 126 ARE ROMAN COMPLEX UPPER CASE SYM09890
C CHARACTERS 127 TO 150 ARE GREEK COMPLEX UPPER CASE SYM09900
C CHARACTERS 151 TO 176 ARE ROMAN COMPLEX LOWER CASE SYM09910
C CHARACTERS 177 TO 200 ARE GREEK COMPLEX LOWER CASE SYM09920
C CHARACTERS 201 TO 226 ARE ITALIC UPPER CASE SYM09930
C CHARACTERS 227 TO 250 ARE MATHEMATICAL AND SPECIAL SYMBOLS SYM09940
C CHARACTERS 251 TO 276 ARE ITALIC LOWER CASE SYM09950
C CHARACTERS 277 TO 300 ARE MATHEMATICAL AND SPECIAL SYMBOLS SYM09960
C CHARACTERS 301 TO 320 ARE SIMPLEX DIGITS AND SPECIAL SYMBOLS SYM09970
C CHARACTERS 321 TO 340 ARE COMPLEX DIGITS AND SPECIAL SYMBOLS SYM09980
C CHARACTERS 341 TO 360 ARE ITALIC DIGITS AND SPECIAL SYMBOLS SYM09990
C CHARACTERS 361 TO 380 ARE DUPLES DIGITS AND SPECIAL SYMBOLS SYM10000
C CHARACTERS 381 TO 432 ARE DUPLEX UPPER AND LOWER CASE SYM10010
C ISPEC(11) ARE ELEVEN SPECIAL CHARACTERS CHOSEN FROM THE NON- SYM10020
C FORTRAN SET AT YOUR SITE. CURRENT IMPLEMENTATIONS FOLLOW SYM10030
C SP11 MAY BE SET TO THE COMPUTER STOP CODE IF ONE EXISTS. SYM10040
C SP1 \ NEXT CHARACTER SUBSCRIPT SYM10050

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C	SP2	"	NEXT CHARACTER SUPERSCRIP	SYM10060
C	SP3	@	TURN ON UPPER CASE	SYM10070
C	SP4	#	TURN ON LOWER CASE	SYM10080
C	SP5	&	TURN ON COMPLEX LETTERS	SYM10090
C	SP6	^	NEXT CHARACTER GREEK LETTER OR MATH SYMBOL	SYM10100
C	SP7	%	TURN ON SIMPLEX LETTERS	SYM10110
C	SP8	?	BACK SPACE LAST CHARACTER	SYM10120
C	SP9	!	ITALIC LETTERS	SYM10130
C	SP10	;	DUPLEX LETTERS	SYM10140
C	SP11	:	TERMINATE SCAN	SYM10150
C				SYM10160
C			*****	SYM10170
C				SYM10180
			DIMENSION TEXT(1)	SYM10190
			EQUIVALENCE(ALFBET,IALFBE)	SYM10200
			DIMENSION ALFBET(4711)	SYM10210
			INTEGER STRIN,CHAR,TEXT,ALFBET,ISTART	SYM10220
			EQUIVALENCE (IB(1),IFORT(1)), (IB(48),ISPEC(1))	SYM10230
C			RX=CX-SY	SYM10240
C			RY=SX+CY	SYM10250
C			RX(X,Y)=RY(-Y,X)	SYM10260
C			RY(X,Y)=RX(Y,-X)	SYM10270
C			IFLD GETS N BITS STARTING AT NSTART TH BIT FROM RIGHT	SYM10280
			IFLD(NSTART,NBITS,IWORD)=MOD(IWORD/(2**(NSTART-NBITS)),2**NBITS)+(SYM10290
			2(1-ISIGN(1,IWORD))/2)*(2**NBITS-1)	SYM10300
C			***USE ABOVE CARD IF YOUR MACHINE HAS ONES COMPLEMENT ARITHMETIC	SYM10310
C			2 (1-ISIGN(1,IWORD))/2)*(2**NBITS-MINO(1,	SYM10320
C			XMOD(-IWORD,2**(NSTART-NBITS))))	SYM10330
C			***USE ABOVE CARD IF YOUR MACHINE HAS TWOS COMPLEMENT ARITHMETIC	SYM10340
C			CHAR(J) GETS THE J TH CHARACTER OF NCHAR BITS FROM A STRING	SYM10350
C			COMPOSED OF WORDS NWORD BITS LONG.	SYM10360
			DEFINE STRIN(I,TEXT)=TEXT(I)	SYM10370
			CHAR(J)=IFLD((NWORD-MOD((J-1),NCWD)*NCHAR),NCHAR,STRIN((J+NCWD-1)/	SYM10380
			2NCWD,TEXT))	SYM10390
			R(XX,YY)=CO*XX-SI*YY	SYM10400
5			IF (.NOT.FIRST) GO TO 20	SYM10410
			NCWD=NWORD/NCHAR	SYM10420
			DO 10 I=1,58	SYM10430
			LL=IFLD(NWORD,NCHAR,IB(I))	SYM10440
			IA(LL+1)=I	SYM10450
10			CONTINUE	SYM10460
20			FIRST=.FALSE.	SYM10470
			THE=THETA*355./(180.*113.)	SYM10480
			SI=SIN(THE)	SYM10490
			CO=COS(THE)	SYM10500
			SCALE=HEIGHT/21.	SYM10510
C			OFFSET OF 11 UNITS	SYM10520
			X1=X	SYM10530
			Y1=Y	SYM10540
			IF (X1.GT.998.5) X1=OLDX(6)	SYM10550
			IF (Y1.GT.998.5) Y1=OLDY(6)	SYM10560
			NN=N	SYM10570
			IF (NN) 50,30,120	SYM10580
30			ICHR=NCWD-1	SYM10590
			IG=CHAR(ICHR+1)	SYM10600
			IC=IA(IG+1)	SYM10610
			IF (IC.LE.47) GO TO 40	SYM10620
C			WRITE(1OUT,40) IG	SYM10630
			GO TO 440	SYM10640
40			NN=1	SYM10650
			GO TO 140	SYM10660
50			IF (N.EQ.-1) GO TO 60	SYM10670
			CALL PLOT (X1,Y1,2)	SYM10680

60	IG=TEXT(1)+1	SYM10690
	IF (IG.LE.22) GO TO 70	SYM10700
C	WRITE(IOUT,41) IG	SYM10710
	GO TO 440	SYM10720
70	I6=JSTSYM(IG)	SYM10730
	I5=30	SYM10740
80	I8=IFLD(I5,3,ISYMB0(I6))	SYM10750
C	GO TO CENTER OF SYMBOL	SYM10760
	IF (I8) 100,90,100	SYM10770
90	CALL PLOT (X1,Y1,3)	SYM10780
	X1=X1+20.	SYM10790
	Y1=Y1+20.	SYM10800
	GO TO 440	SYM10810
100	IX=IFLD(I5-3,6,ISYMB0(I6))	SYM10820
	IY=IFLD(I5-9,6,ISYMB0(I6))	SYM10830
	XI=SCALE*(FLOAT(IX-32))	SYM10840
	YI=SCALE*(FLOAT(IY-32))	SYM10850
	CALL PLOT (X1+R(XI,YI),Y1+R(YI,-XI),I8)	SYM10860
	I5=45-I5	SYM10870
	IF (I5.EQ.30) I6=I6+1	SYM10880
	GO TO 80	SYM10890
120	DO 130 I=1,6	SYM10900
	OLDX(I)=X	SYM10910
130	OLDY(I)=Y	SYM10920
	ICHR=0	SYM10930
C	CHARACTER	SYM10940
140	IC=0	SYM10950
C	SIMPLEX CAPITAL LETTERS	SYM10960
	IP=0	SYM10970
	ICAP=0	SYM10980
	ICOMP=0	SYM10990
	ITALIC=0	SYM11000
	IDUPLE=0	SYM11010
C	NOT GREEK LETTERS	SYM11020
	IGREEK=0	SYM11030
C	PRINT SYMBOL ON LINE (NOT SUBSCRIPT OR SUPERScript)	SYM11040
	L=1	SYM11050
	SCALE=HEIGHT/21.	SYM11060
	DO 430 I1=1,NN	SYM11070
C	EXTRACT CHARACTER FROM TEXT	SYM11080
	ICHR=ICHR+1	SYM11090
	IG=CHAR(ICHR)	SYM11100
	IC=IA(IG+1)	SYM11110
	IF (ICHR.GT.NN.AND.N.GT.0) GO TO 450	SYM11120
	IF (IC.LE.58) GO TO 160	SYM11130
	WRITE (IOUT,150) IG	SYM11140
150	FORMAT (1X,19HILLEGAL INPUT CHAR ,I12)	SYM11150
	GO TO 430	SYM11160
160	IP=ICOMP+ICAP+ITALIC+IDUPLE	SYM11170
	IF (IC-27) 170,410,270	SYM11180
C	NUMBER OF SYMBOL	SYM11190
170	IC=IC+IP+IGREEK-ICAP*IDUPLE*24/(50*380)	SYM11200
180	I6=ISTART(IC)	SYM11210
	I5=30	SYM11220
	IF (LNGTH) GO TO 250	SYM11230
C	PRINT ALPHBETICAL CHARACTER	SYM11240
190	I8=IFLD(I5,3,ALFBET(I6))	SYM11250
C	TEST FOR END OF CHARACTER, I8=0	SYM11260
	IF (I8.EQ.0) GO TO 240	SYM11270
	IX=IFLD(I5-3,6,ALFBET(I6))	SYM11280
	IY=IFLD(I5-9,6,ALFBET(I6))	SYM11290
C	IF L=1, PRINT SYMBOL ON LINE, IF L=2, SUBSCRIPT, IF L=3, SUPERScript	SYM11300
	GO TO (200,210,220), L	SYM11310

200	RSCALE=SCALE		SYM11320
	YOFF=0.		SYM11330
	GO TO 230		SYM11340
C	SUBSCRIPT		SYM11350
210	RSCALE=SCALE*0.5		SYM11360
	YOFF=-HEIGHT/4.		SYM11370
	GO TO 230		SYM11380
C	SUPERSCRIPIT		SYM11390
220	RSCALE=SCALE*0.5		SYM11400
	YOFF=HEIGHT*3./4.		SYM11410
C	ABOVE FACTORS NEEDED TO CORRECT OFFSET FOR DIFFERENT SIZE LETTERS		SYM11420
230	YI=FLOAT(IY-11)*RSCALE+YOFF		SYM11430
	XI=FLOAT(IX-10)*RSCALE		SYM11440
	CALL PLOT (X1+R(XI,YI),Y1+R(YI,-XI),I8)		SYM11450
	I5=45-I5		SYM11460
	IF (I5.EQ.30) I6=I6+1		SYM11470
	GO TO 190		SYM11480
240	IGREEK=0		SYM11490
250	X1=X1+R(WIDTH(IC)*RSCALE,0.0)		SYM11500
	Y1=Y1+R(0.,-WIDTH(IC)*RSCALE)		SYM11510
	DO 260 I=1,5		SYM11520
	OLDX(I)=OLDX(I+1)		SYM11530
260	OLDY(I)=OLDY(I+1)		SYM11540
	OLDX(6)=X1		SYM11550
	OLDY(6)=Y1		SYM11560
	RSCALE=SCALE		SYM11570
	L=1		SYM11580
	GO TO 430		SYM11590
270	IF (IC.GT.47) GO TO 280		SYM11600
	IC=IC+273		SYM11610
	IF (ICOMP.NE.0) IC=IC+20		SYM11620
	IF (ITALIC.NE.0) IC=IC+40		SYM11630
	IF (IDUPLE.NE.0) IC=IC+60		SYM11640
	GO TO 180		SYM11650
280	L1=IC-47		SYM11660
	GO TO (290,300,310,320,330, 340,350,360,380,390, 400), L1		SYM11670
C	SUBSCRIPT		SYM11680
290	L=2		SYM11690
	GO TO 430		SYM11700
C	SUPERSCRIPIT		SYM11710
300	L=3		SYM11720
	GO TO 430		SYM11730
C	UPPER CASE		SYM11740
310	ICAP=0		SYM11750
	GO TO 430		SYM11760
C	LOWER CASE		SYM11770
320	ICAP=50		SYM11780
	GO TO 430		SYM11790
C	COMPLEX LETTERS		SYM11800
330	ICOMP=100		SYM11810
	ITALIC=0		SYM11820
	IDUPLE=0		SYM11830
	GO TO 430		SYM11840
C	GREEK LETTERS		SYM11850
340	IGREEK=26		SYM11860
	IF (IDUPLE.NE.0) IGREEK=0		SYM11870
	GO TO 430		SYM11880
C	SIMPLEX LETTERS		SYM11890
350	ICOMP=0		SYM11900
	ITALIC=0		SYM11910
	IDUPLE=0		SYM11920
	GO TO 430		SYM11930
C	BACKSPACE		SYM11940

360	DO 370 I=1,5		SYM11950
	IK=6-I		SYM11960
	OLDX(IK+1)=OLDX(IK)		SYM11970
370	OLDY(IK+1)=OLDY(IK)		SYM11980
	X1=OLDX(6)		SYM11990
	Y1=OLDY(6)		SYM12000
	GO TO 430		SYM12010
C		ITALIC	SYM12020
380	ITALIC=200		SYM12030
	ICOMP=0		SYM12040
	IDUPLE=0		SYM12050
	GO TO 430		SYM12060
C		DUPLEX	SYM12070
390	IDUPLE=380		SYM12080
	ICOMP=0		SYM12090
	ITALIC=0		SYM12100
	GO TO 430		SYM12110
C		END OF SCAN	SYM12120
400	GO TO 450		SYM12130
C		BLANK SPACE	SYM12140
410	X1=X1+R(20.*RSCALE,0.)		SYM12150
	Y1=Y1+R(0.,-20.*RSCALE)		SYM12160
	DO 420 I=1,5		SYM12170
	OLDX(I)=OLDX(I+1)		SYM12180
420	OLDY(I)=OLDY(I+1)		SYM12190
	OLDX(6)=X1		SYM12200
	OLDY(6)=Y1		SYM12210
	L=1		SYM12220
430	CONTINUE		SYM12230
440	CONTINUE		SYM12240
	IF(LNGTH) GO TO 450		SYM12250
	OLDX(6)=X1		SYM12260
	OLDY(6)=Y1		SYM12270
450	IF (LNGTH) XL=SQRT((X1-X)**2+(Y1-Y)**2)		SYM12280
	IF(LNGTH) GO TO LX		SYM12290
	RETURN		SYM12300
	ENTRY LENGTH(XLEN,HEIGHT,TEXT,N)		SYM12310
C	LENGTH OF TEXT RETURNED IN XLEN		SYM12320
	LNGTH=.TRUE.		SYM12330
	ASSIGN 460 TO LX		SYM12340
	GO TO 5		SYM12350
460	XLEN=XL		SYM12360
	LNGTH=.FALSE.		SYM12370
	RETURN		SYM12380
	END		SYM12390

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